

FIGURE 1

1139.1133101(4000Y489)

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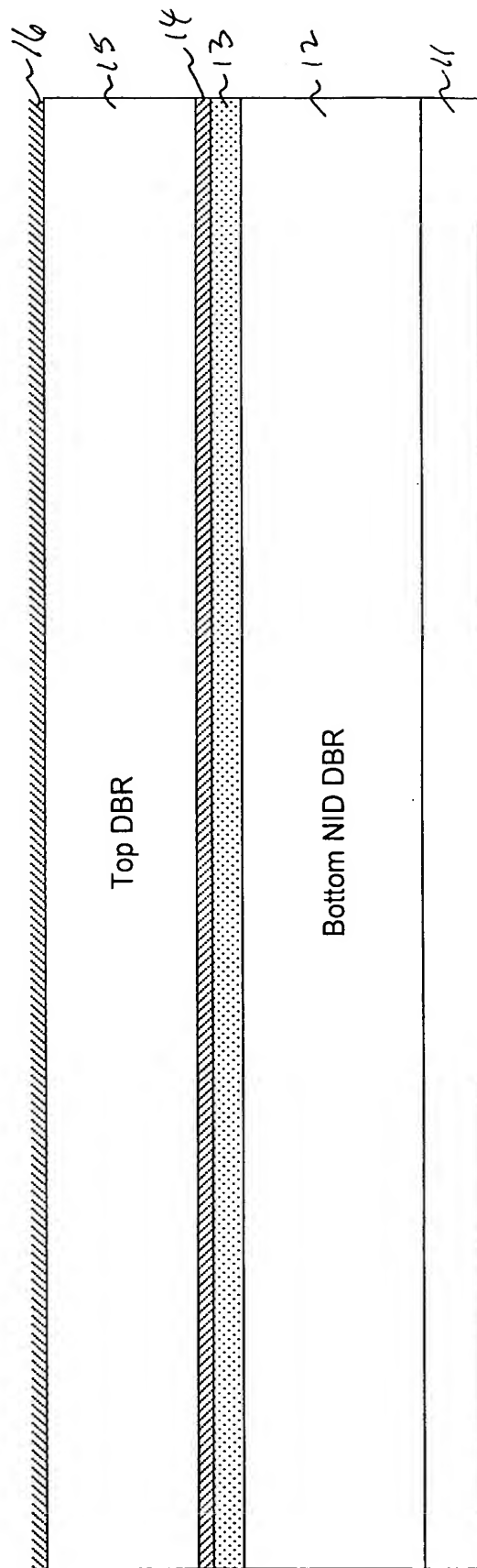


FIGURE 2

1139.113310/
H0004489

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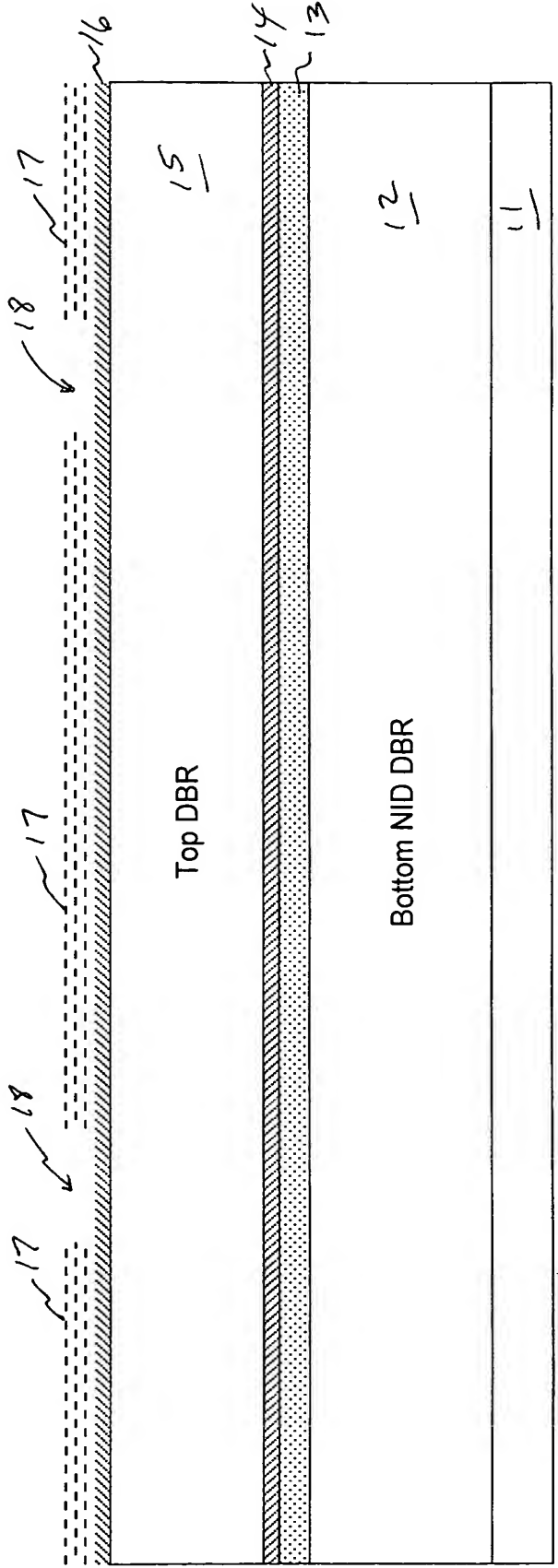


FIGURE 2a

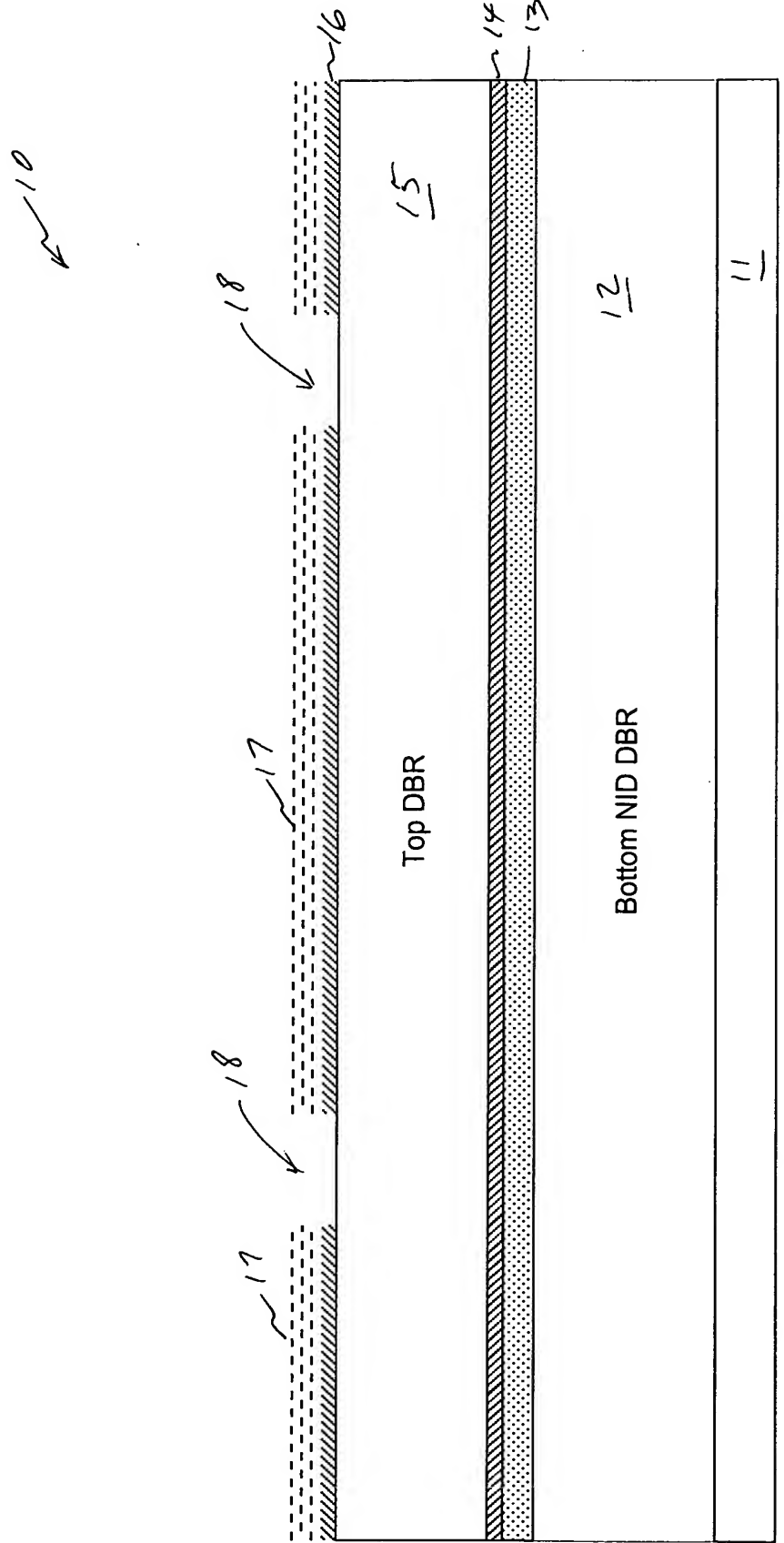


FIGURE 3

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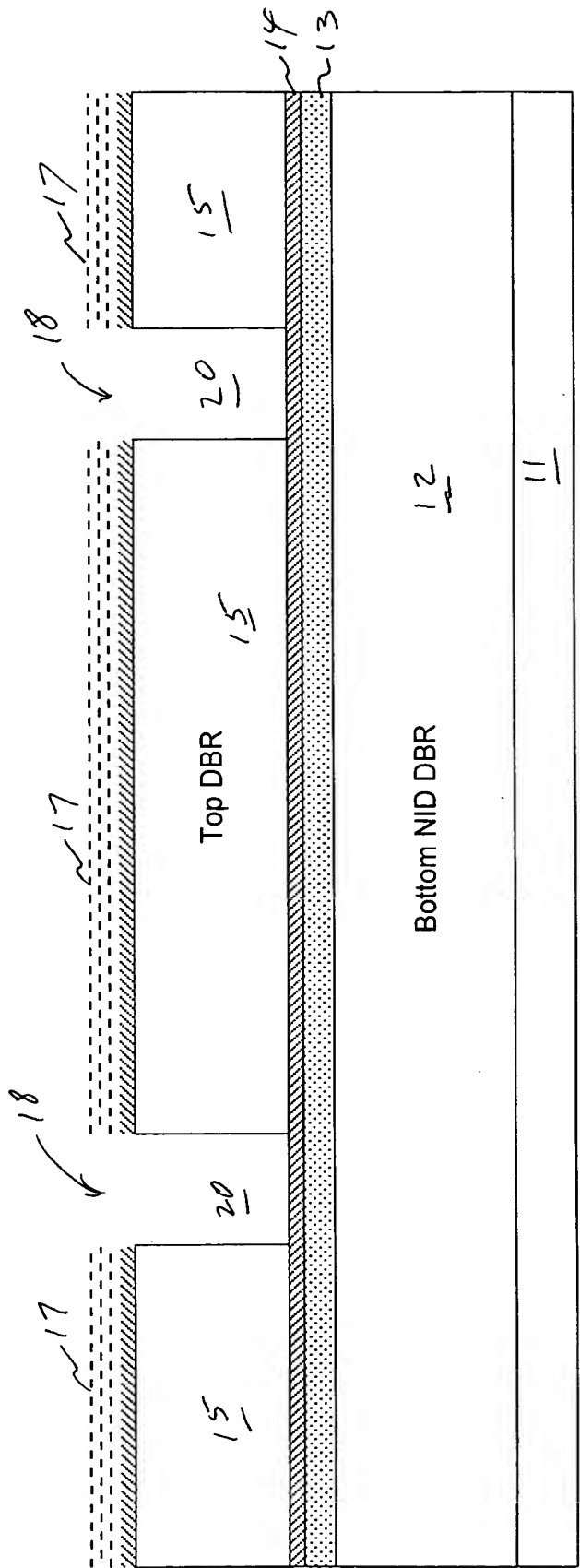


FIGURE 4

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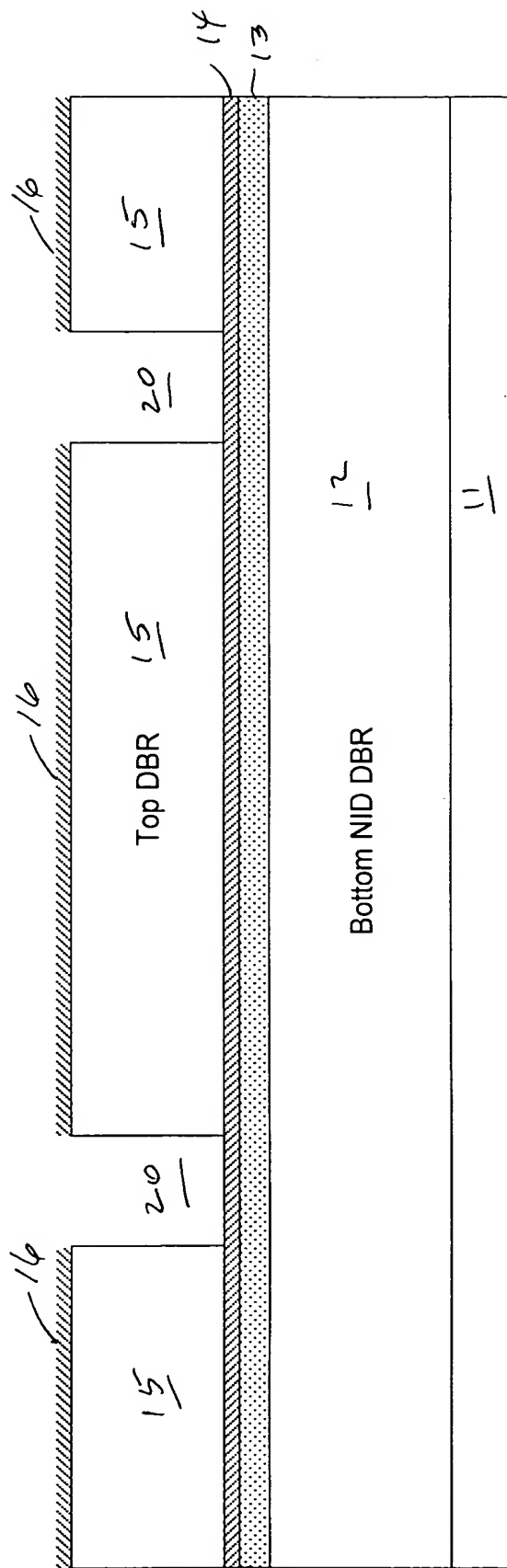


FIGURE 5

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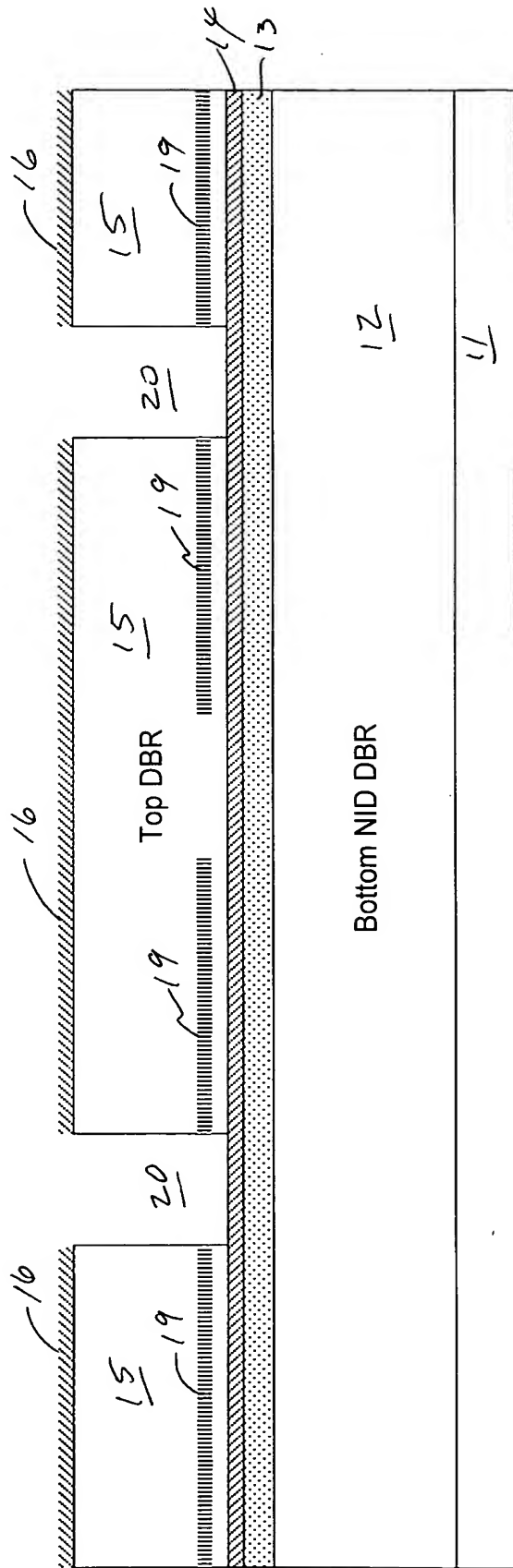


FIGURE 6a

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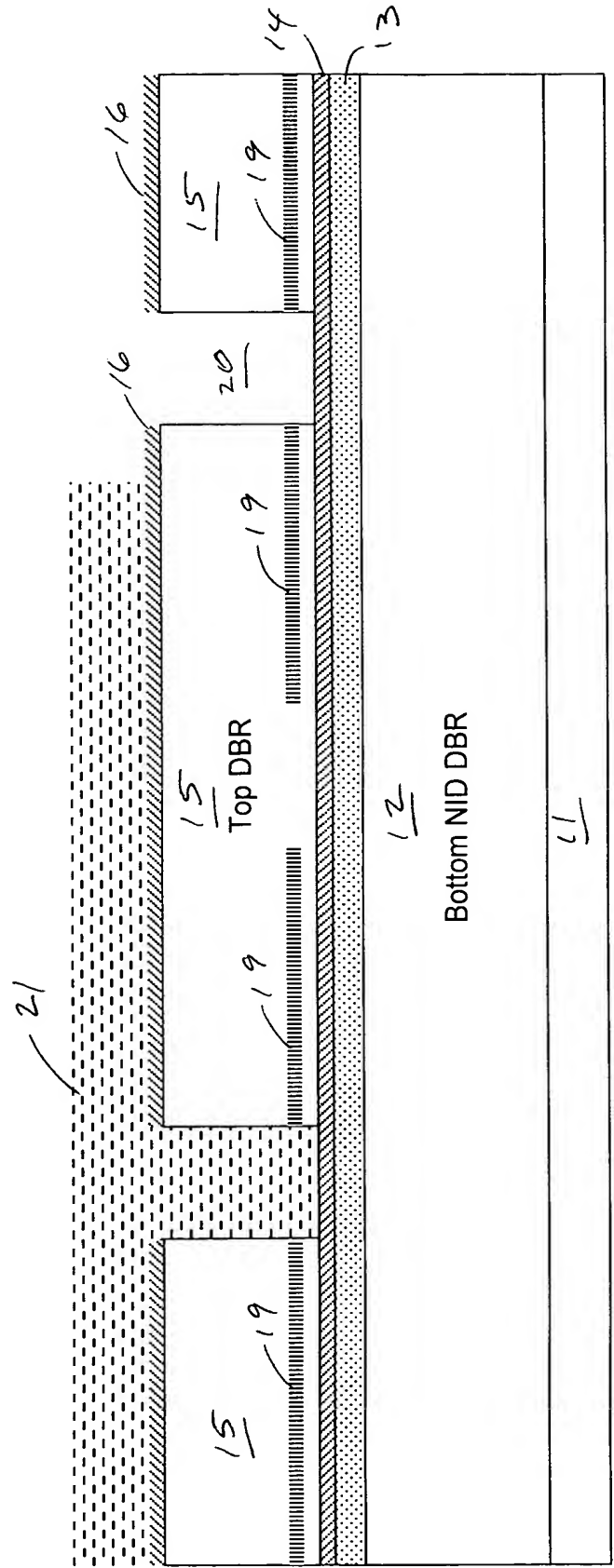


FIGURE 7

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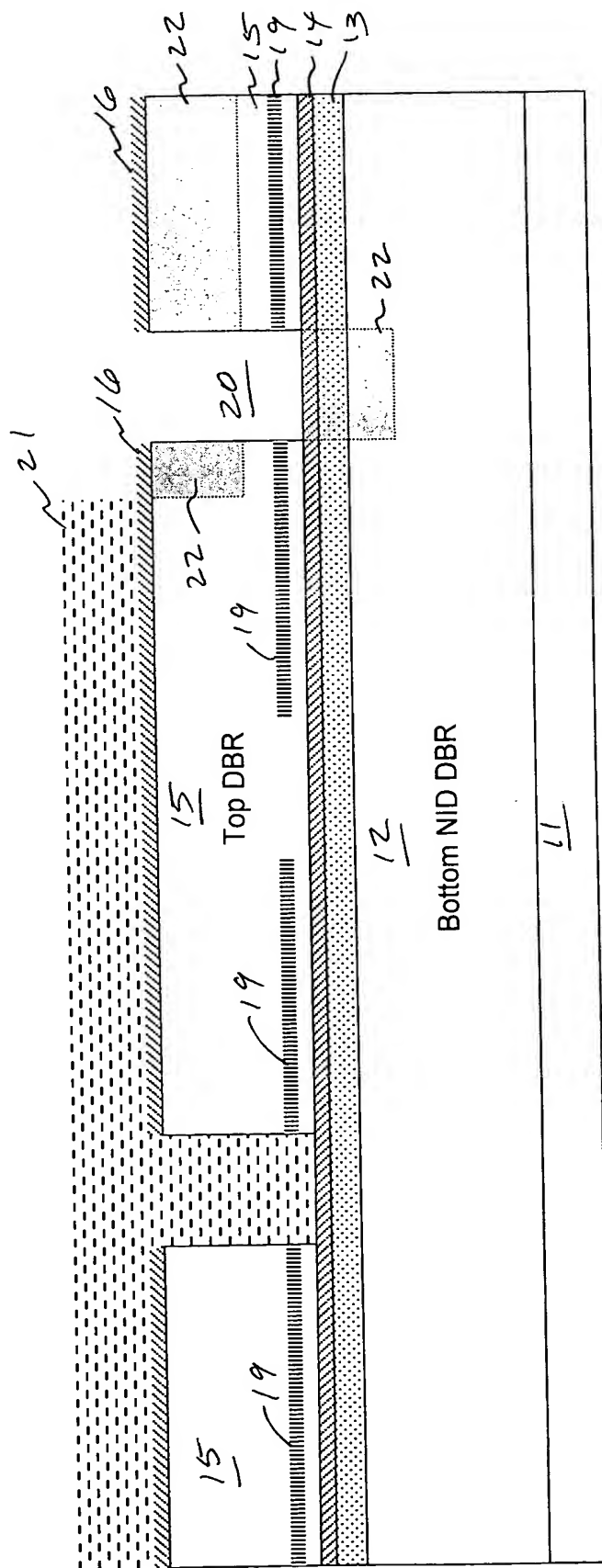


FIGURE 8

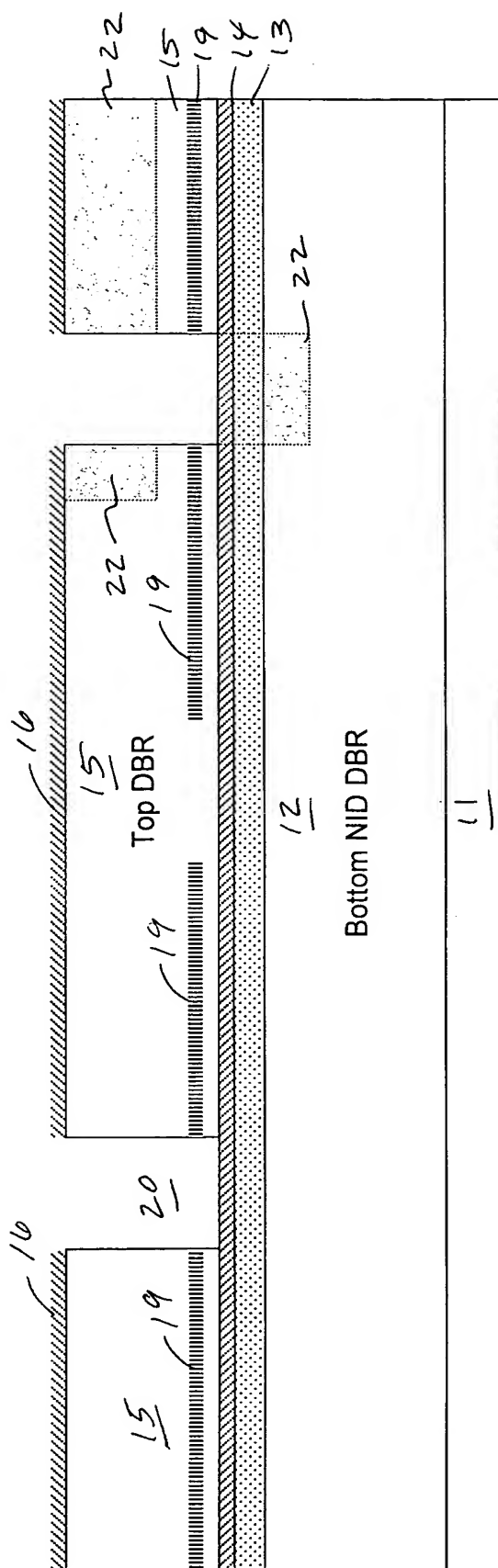
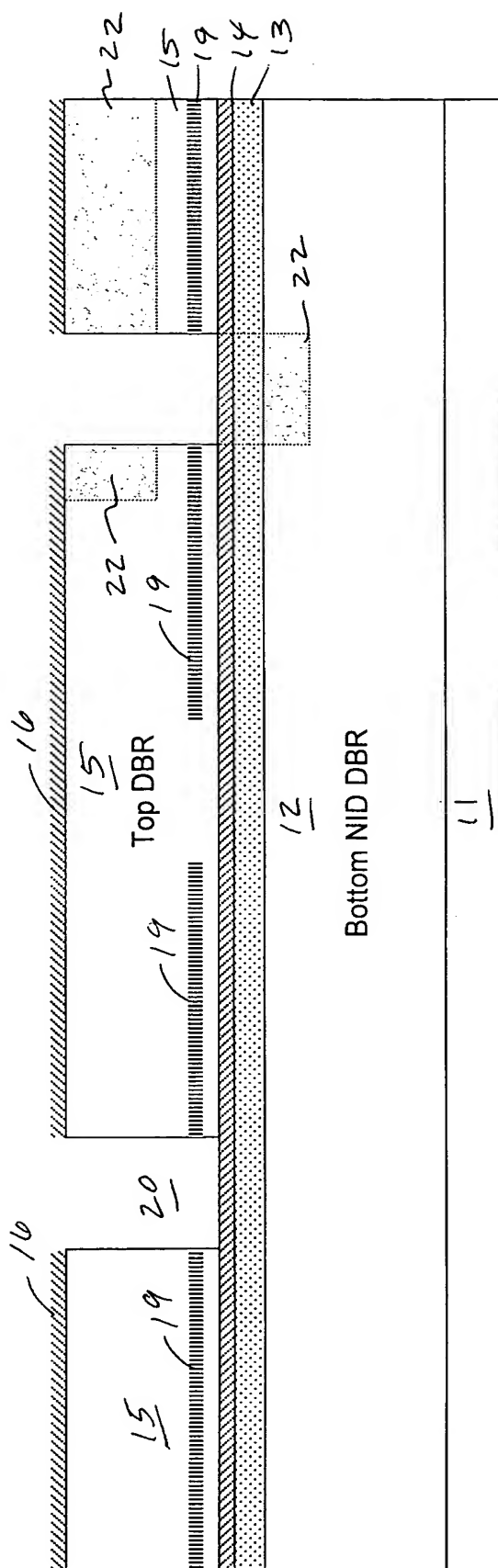


Figure 9

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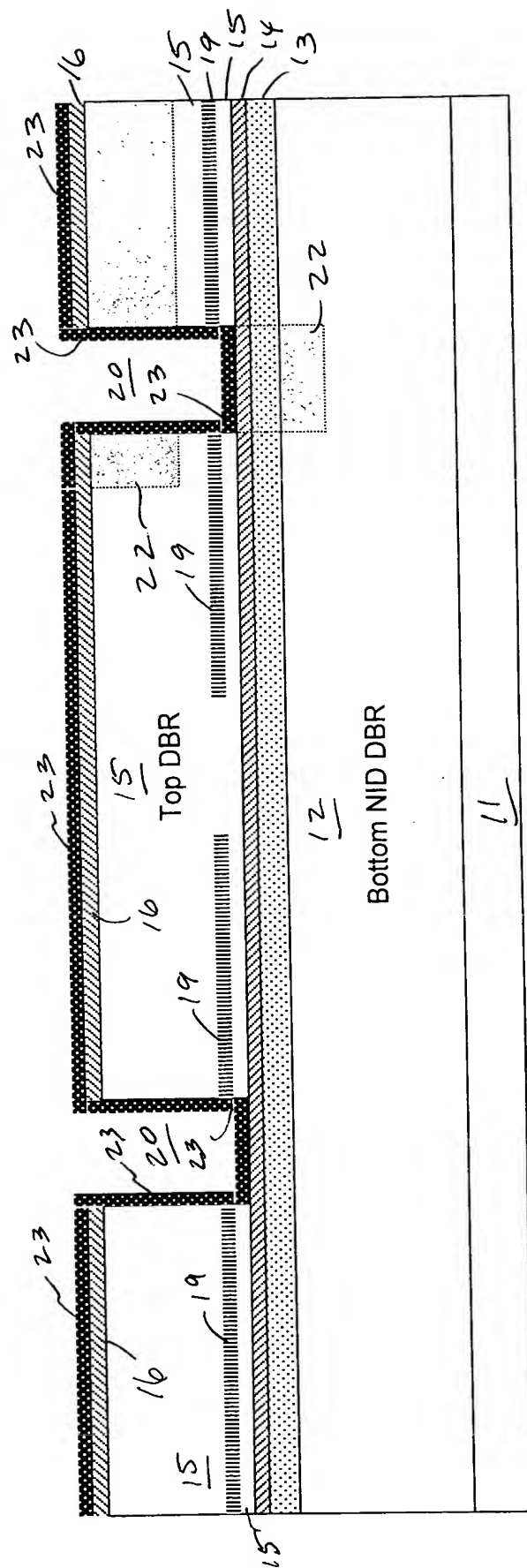


FIGURE 10

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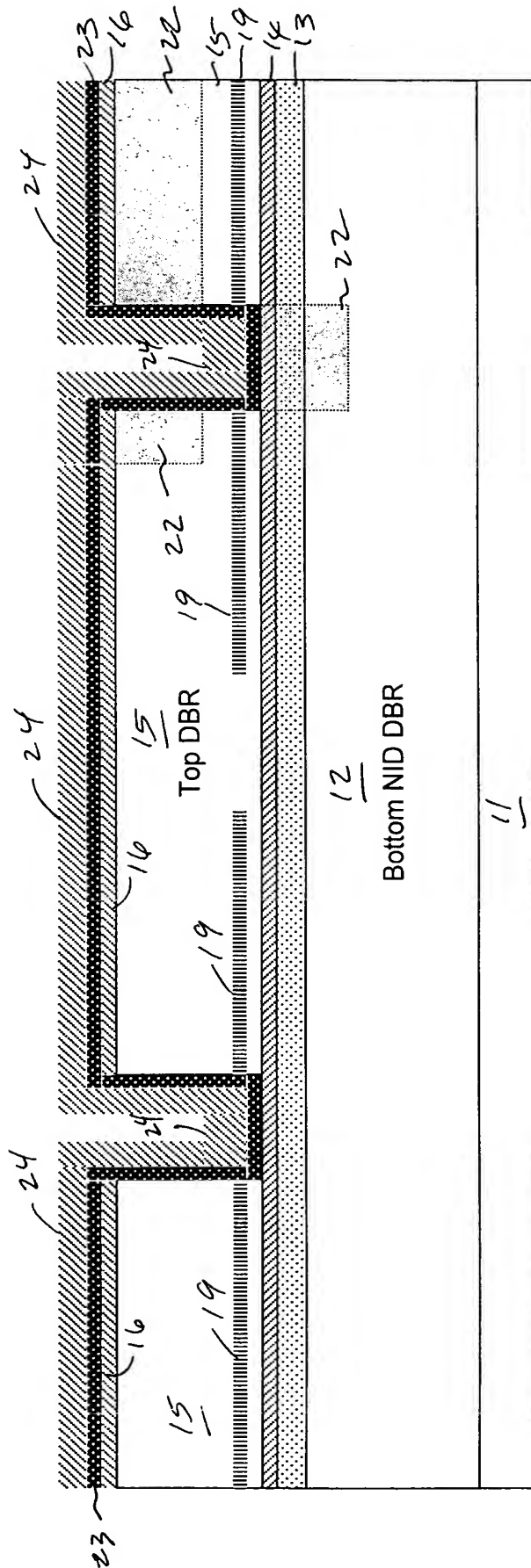


FIGURE 11

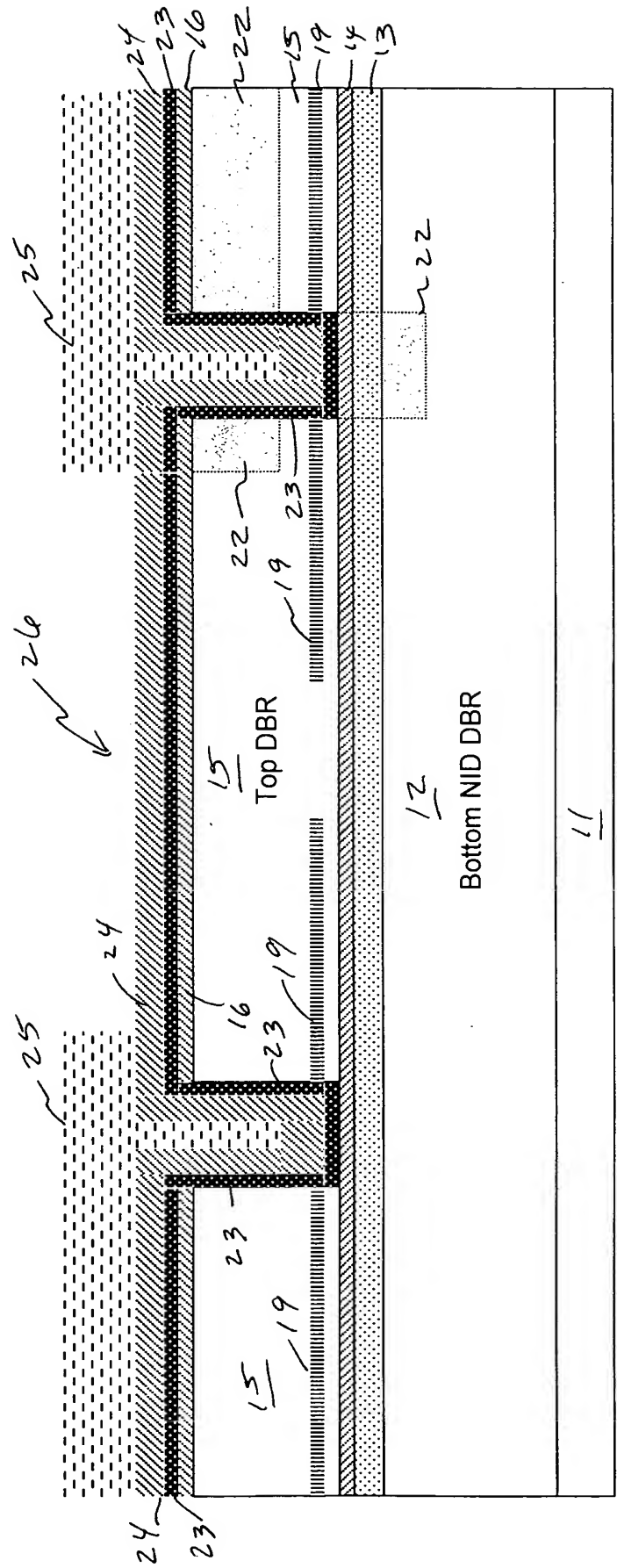


Figure 12

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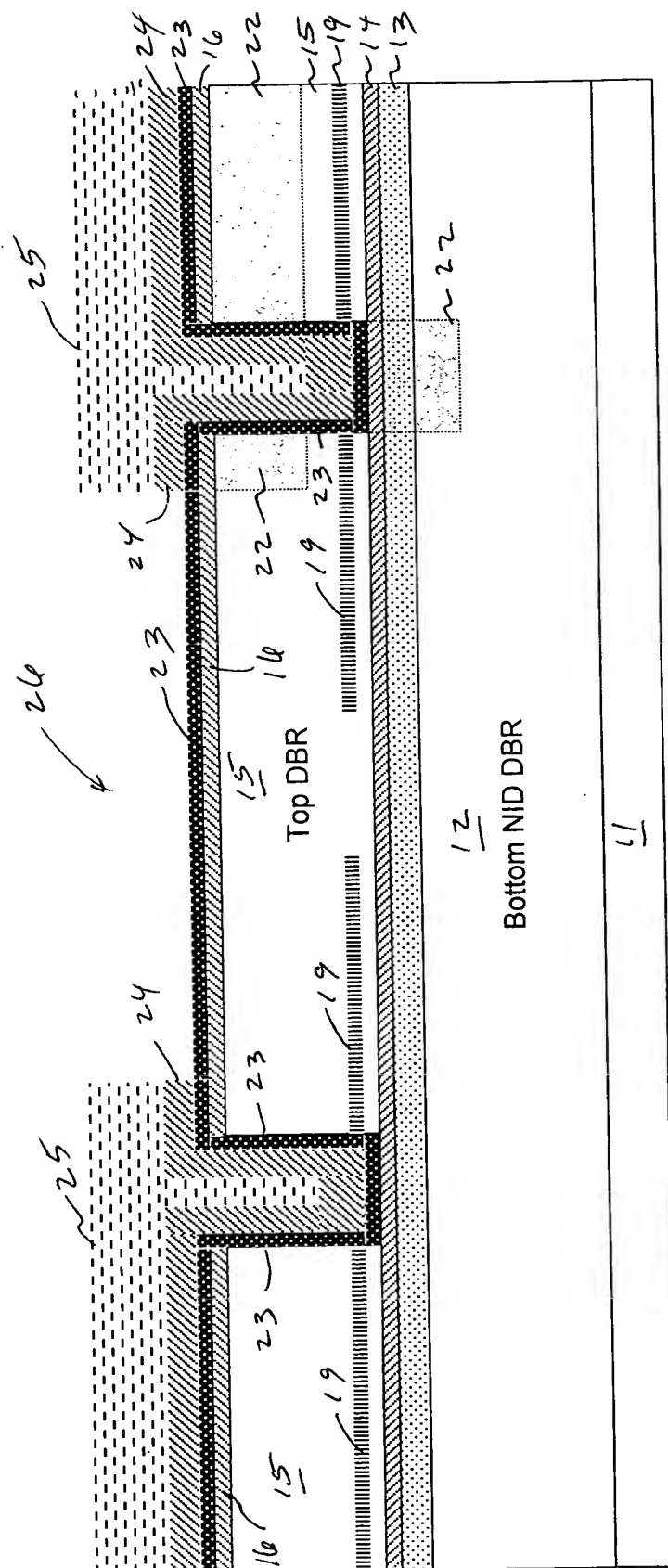
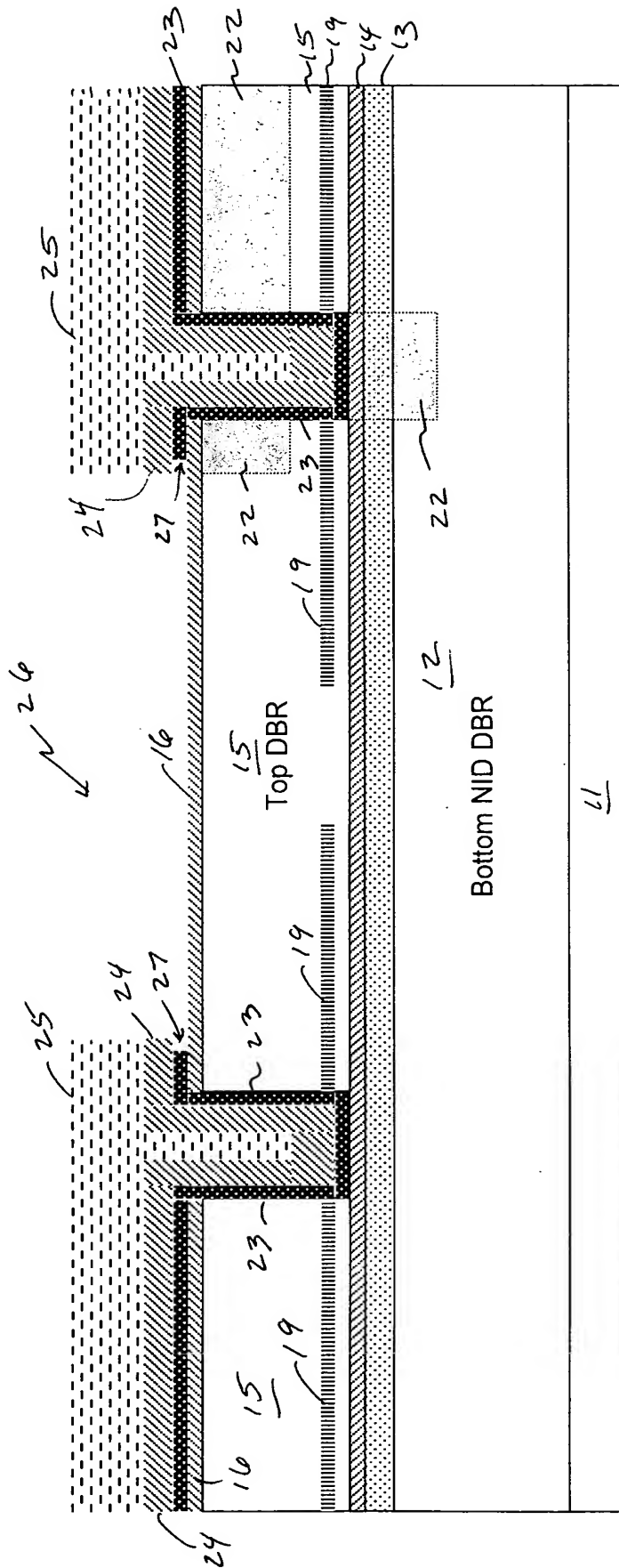


FIGURE 13

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FIGURE 14

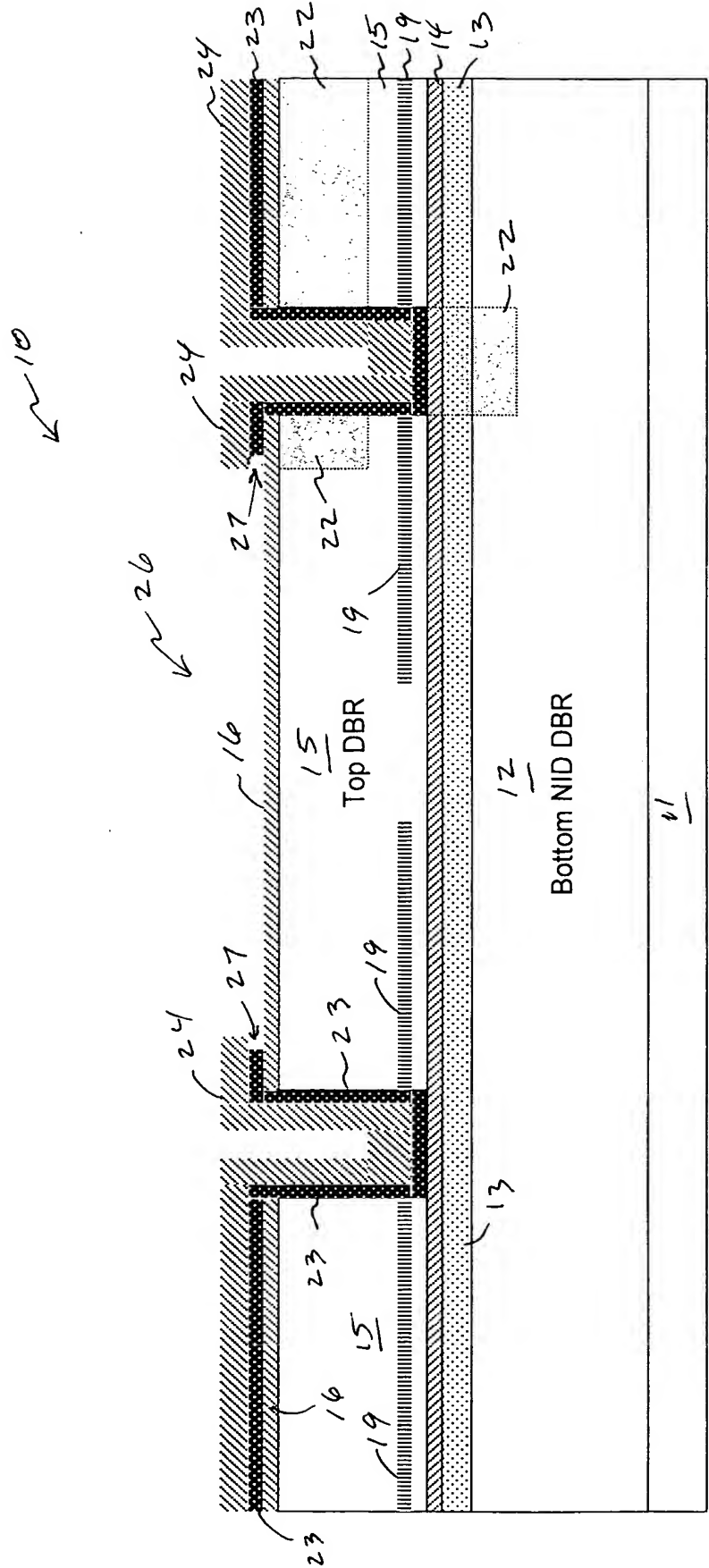


FIGURE 15

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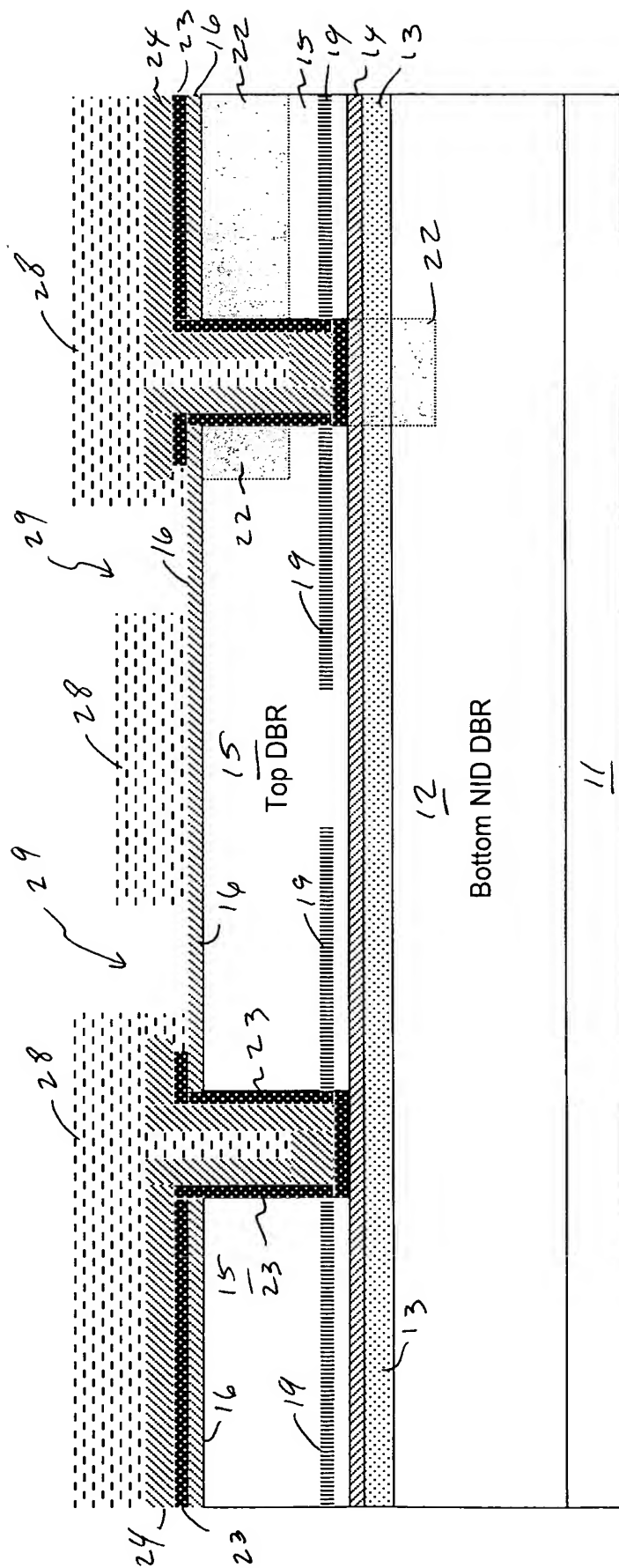


FIGURE 10

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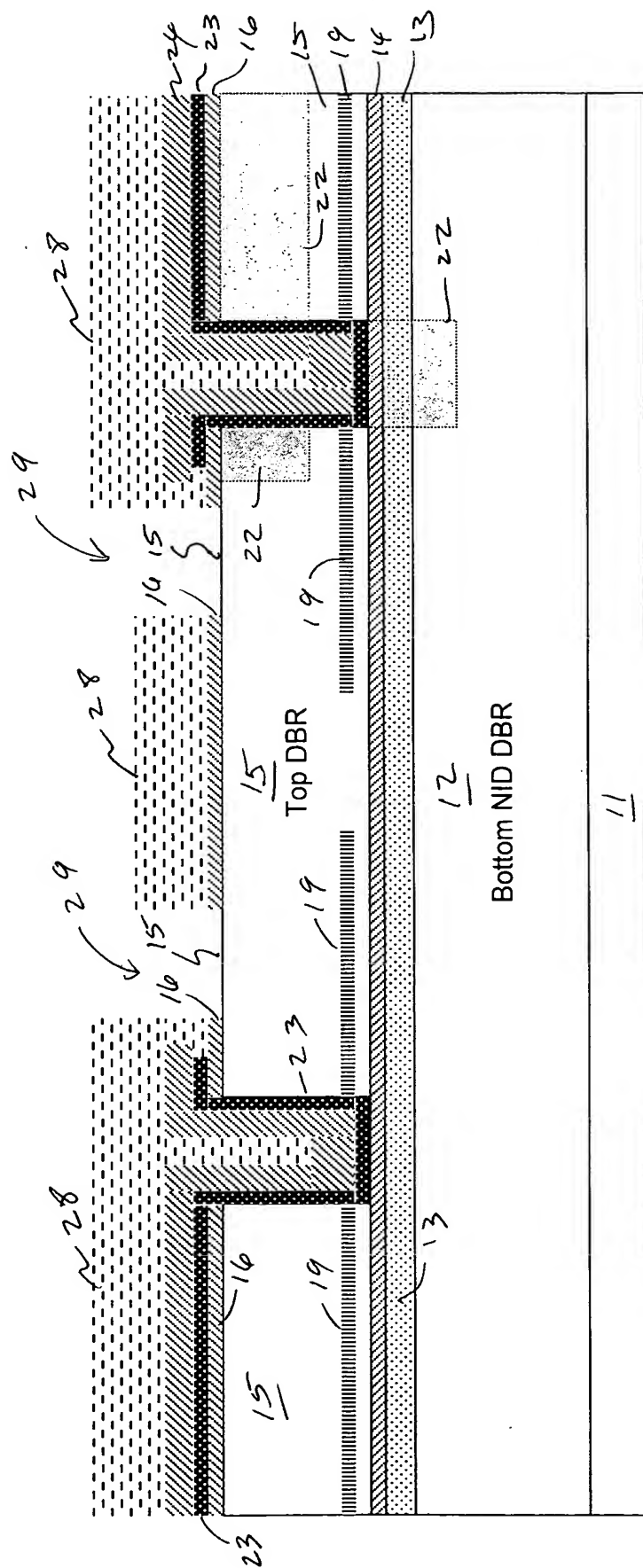
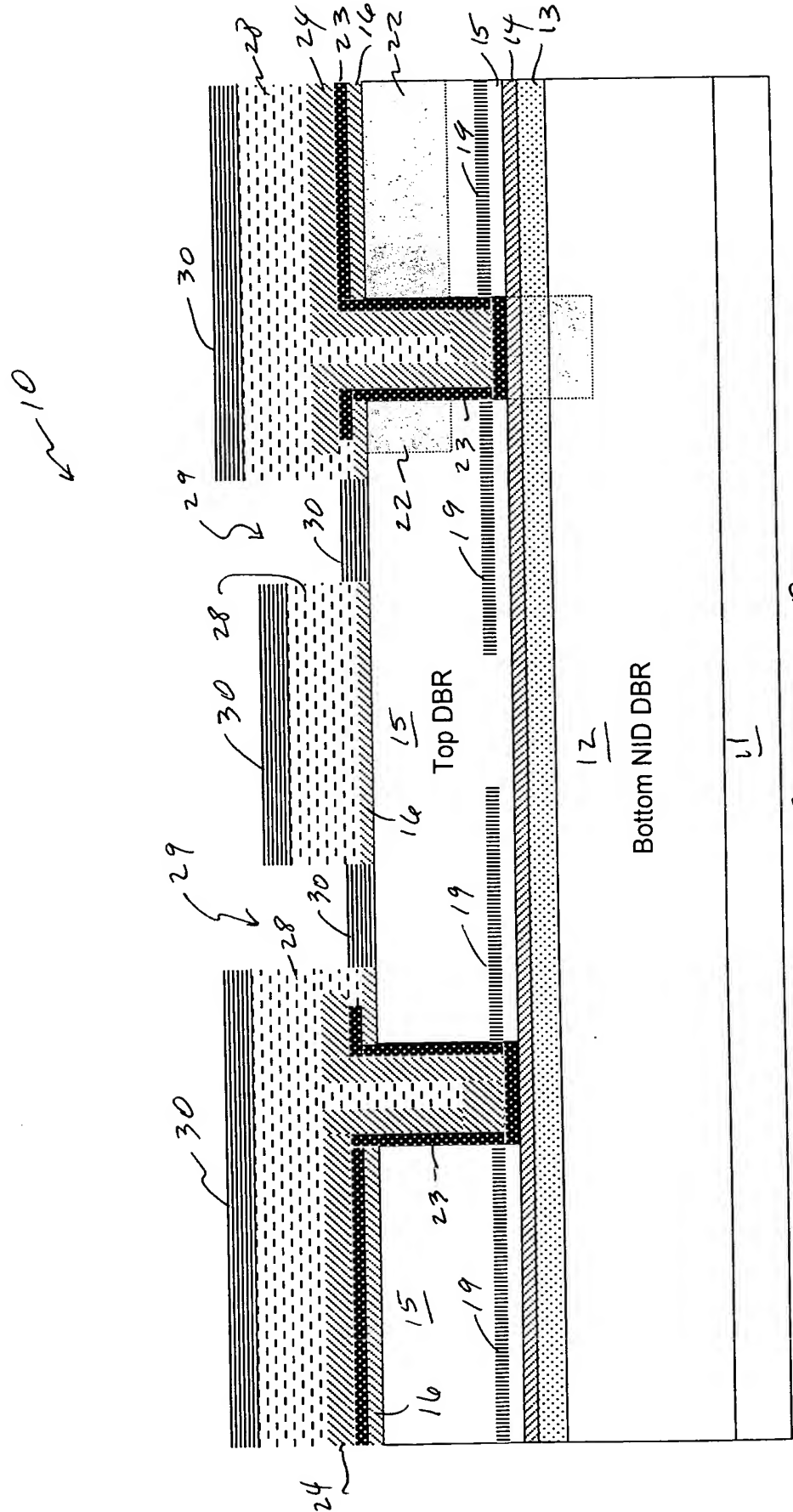


FIGURE 17



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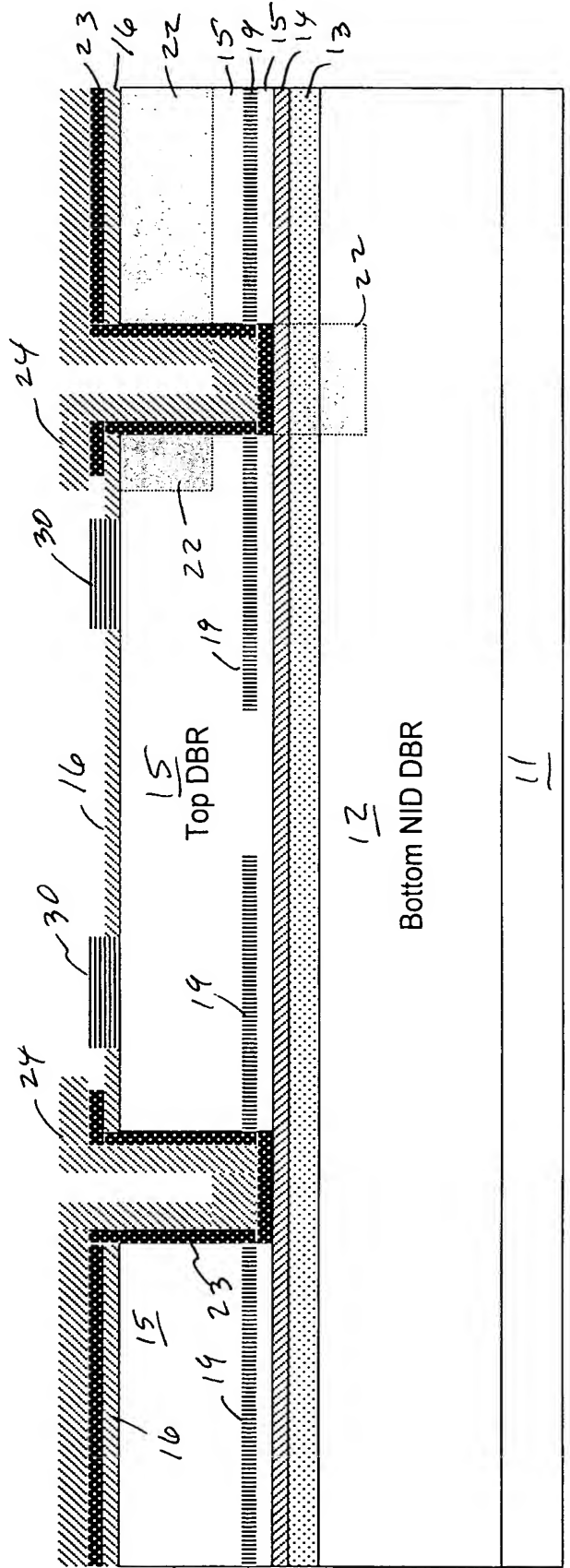


FIGURE 19

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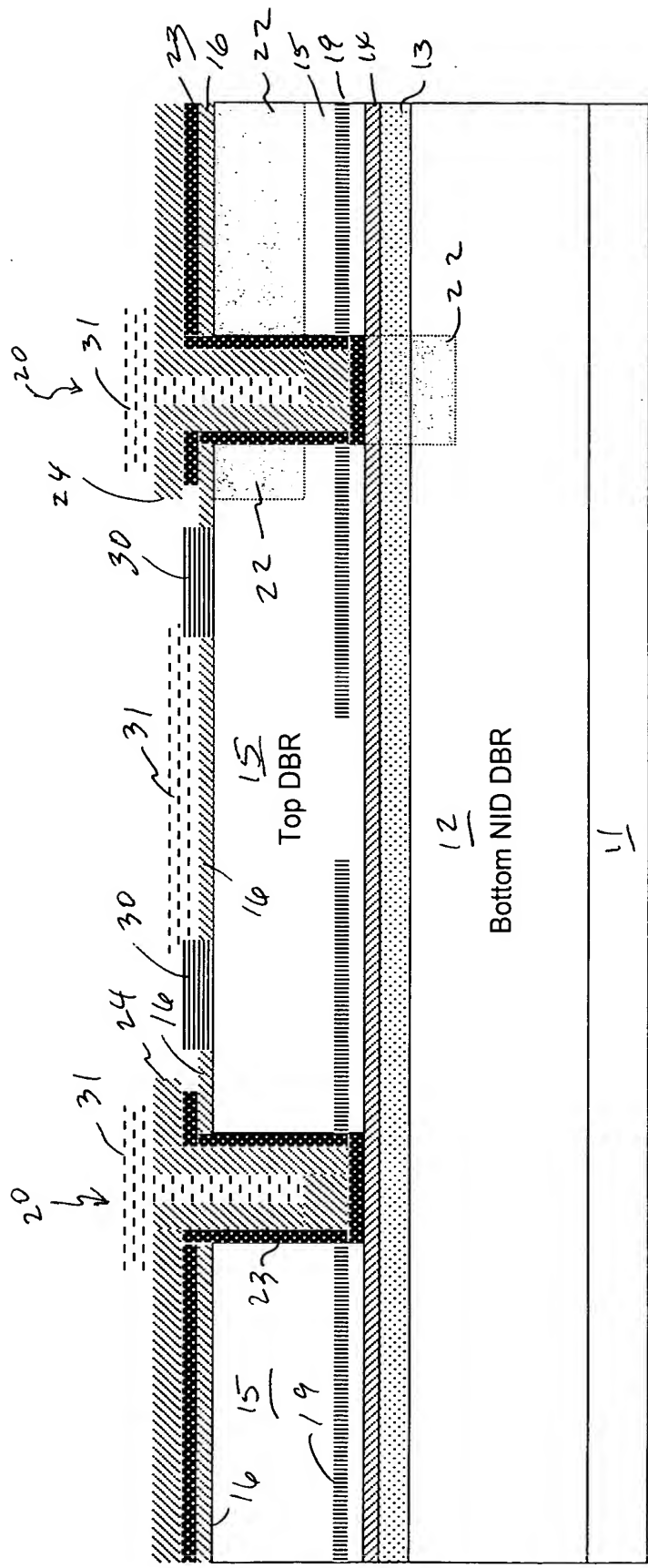


FIGURE 20

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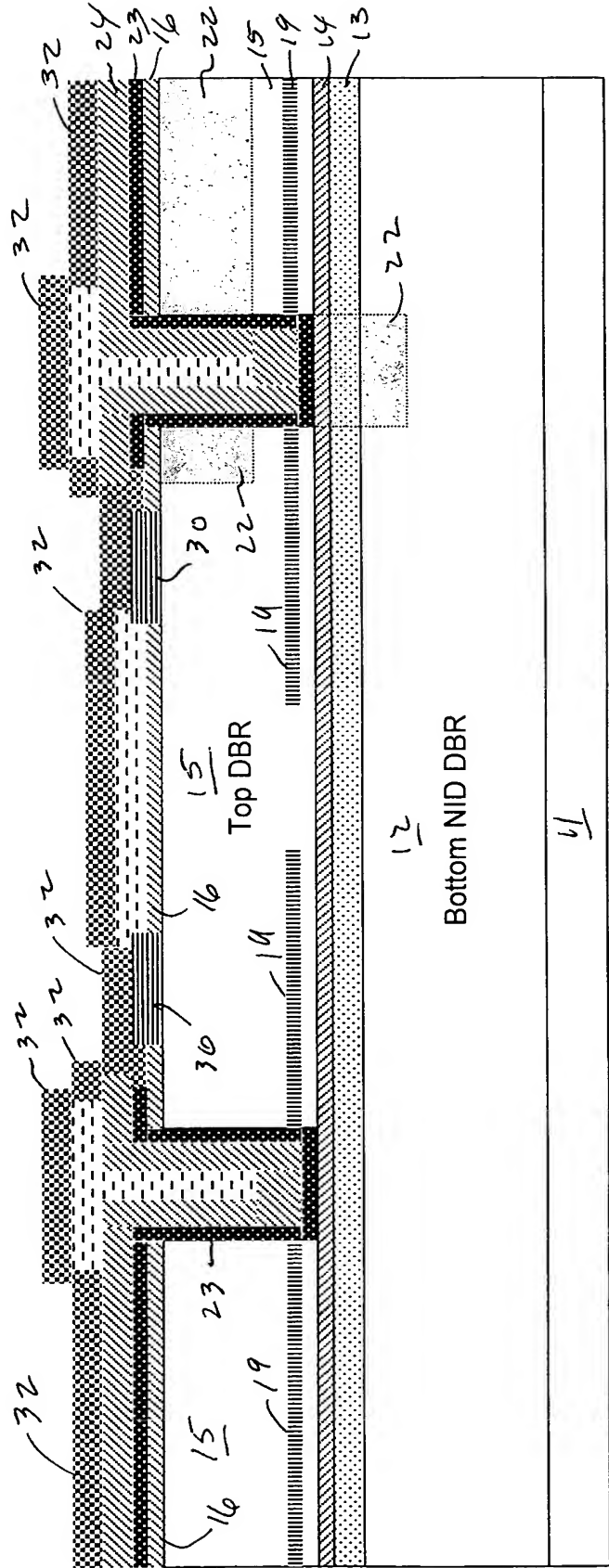


FIGURE 21

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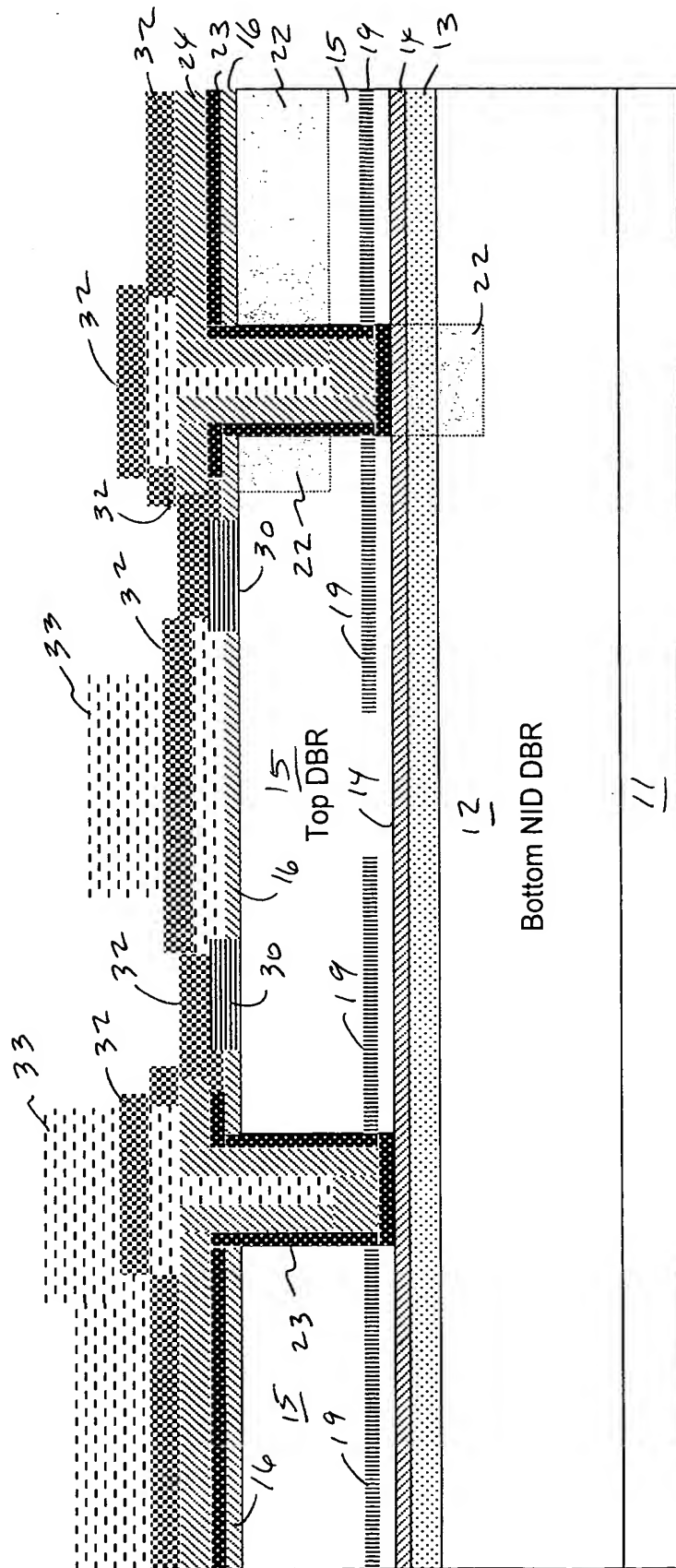


FIGURE 22

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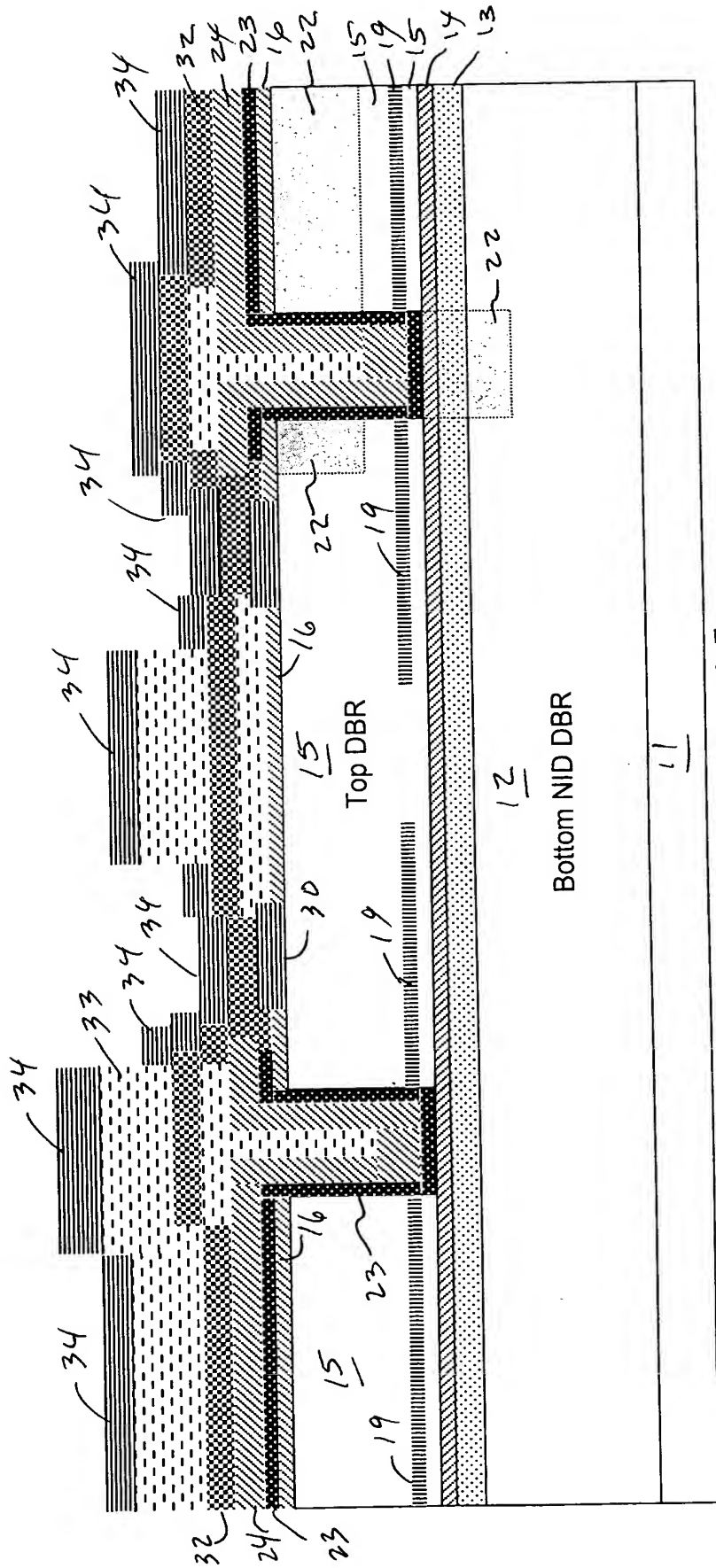


FIGURE 23

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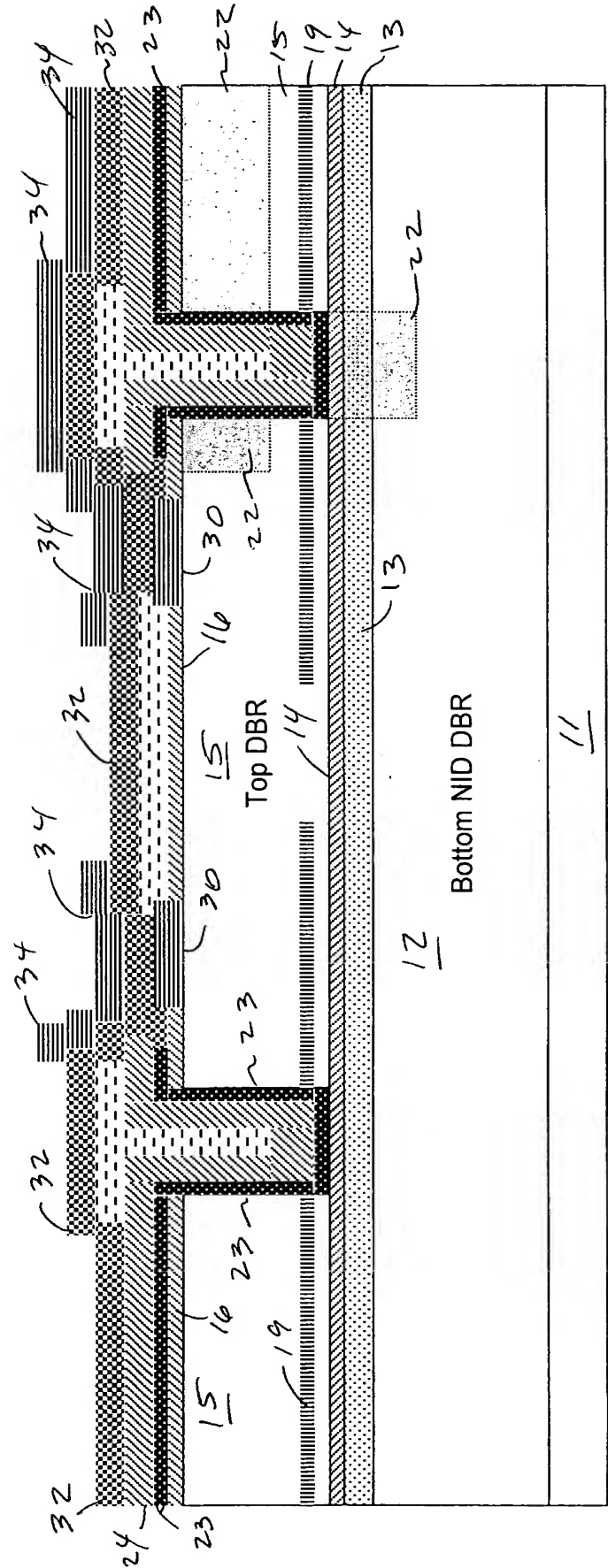


FIGURE 24

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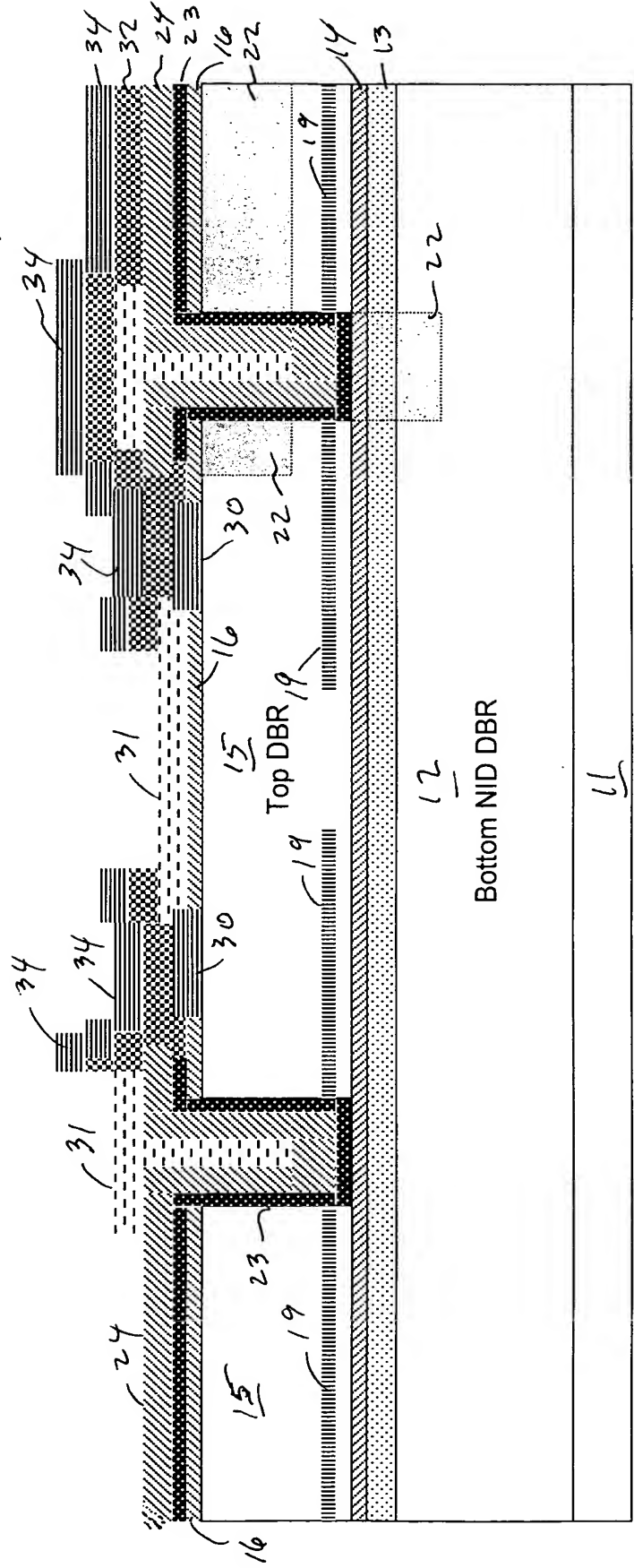


FIGURE 25

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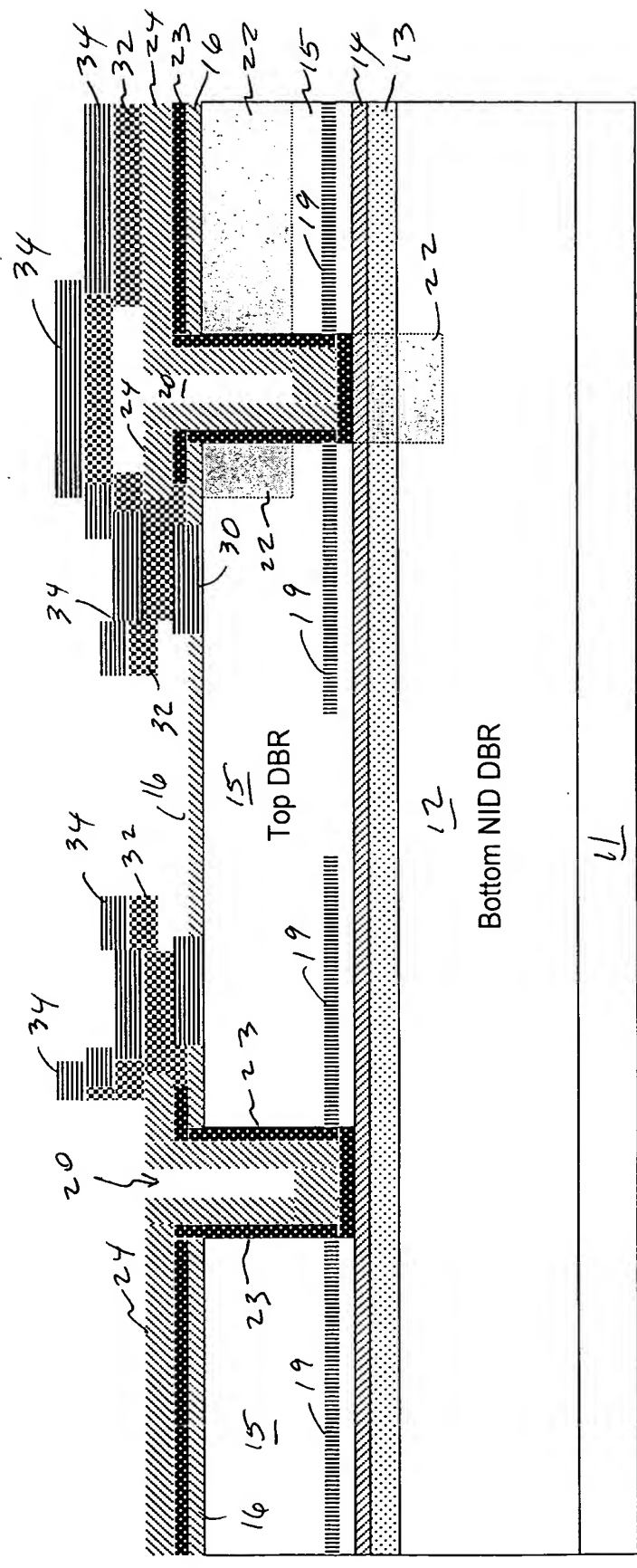


FIGURE 26

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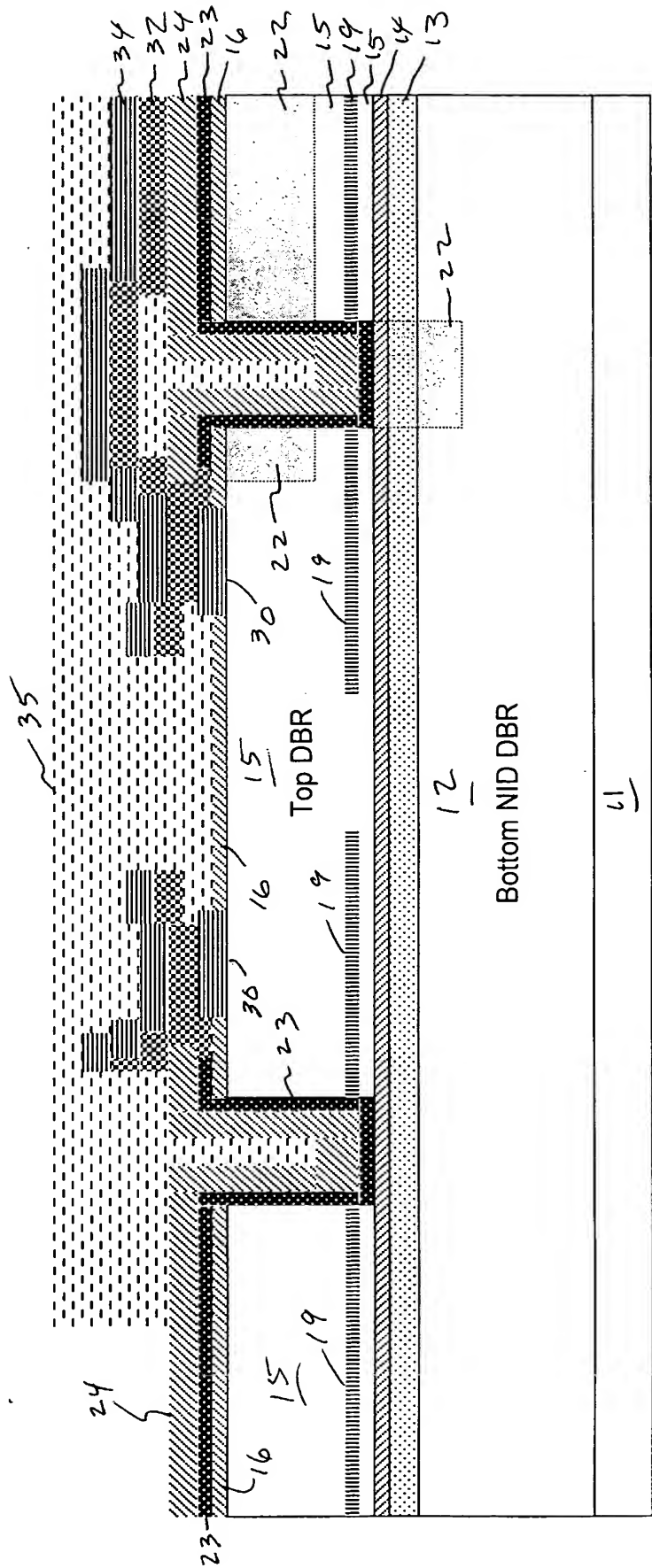


FIGURE 27

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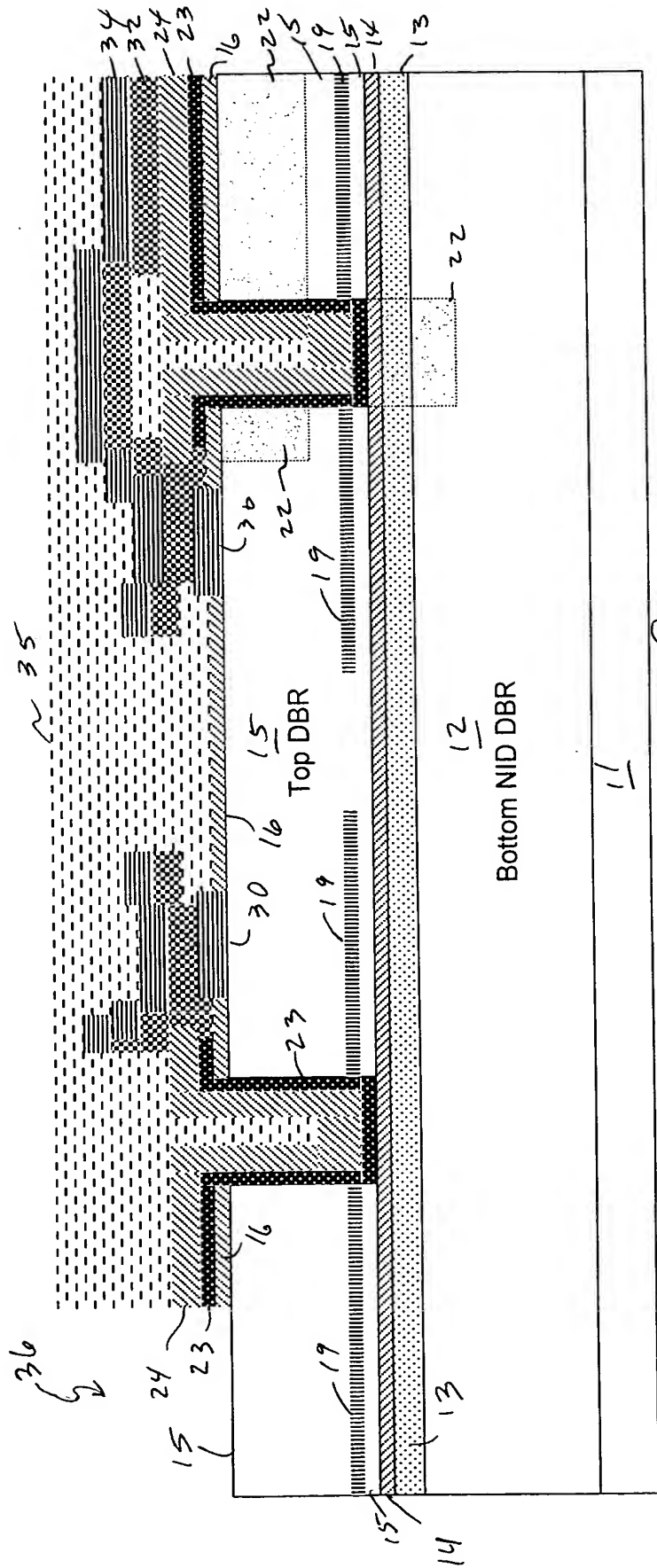
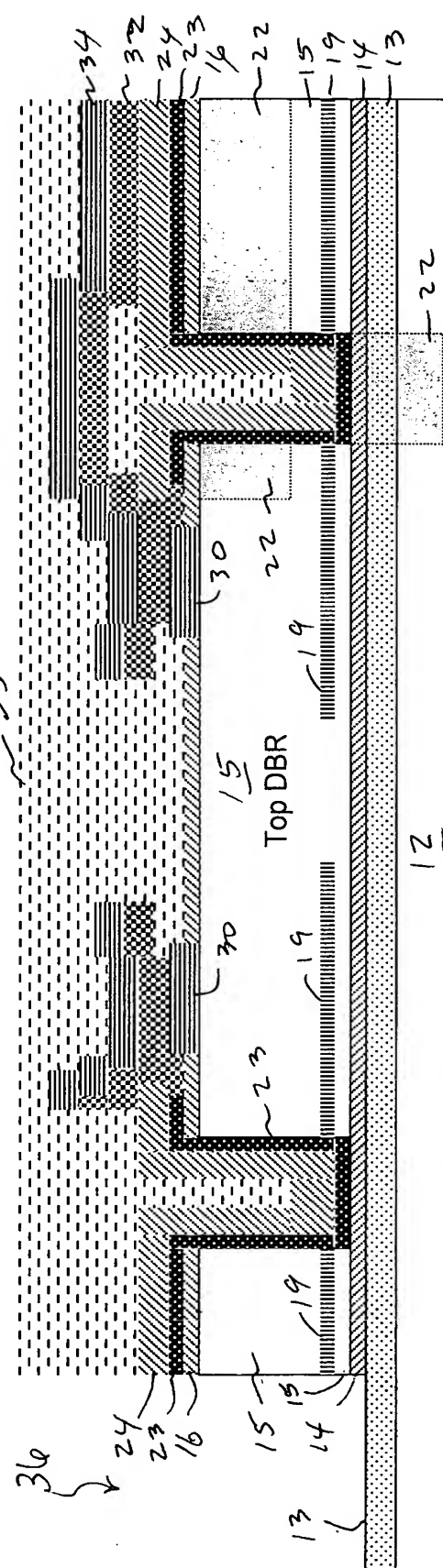


FIGURE 28

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Bottom NID DBR

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FIGURE 29

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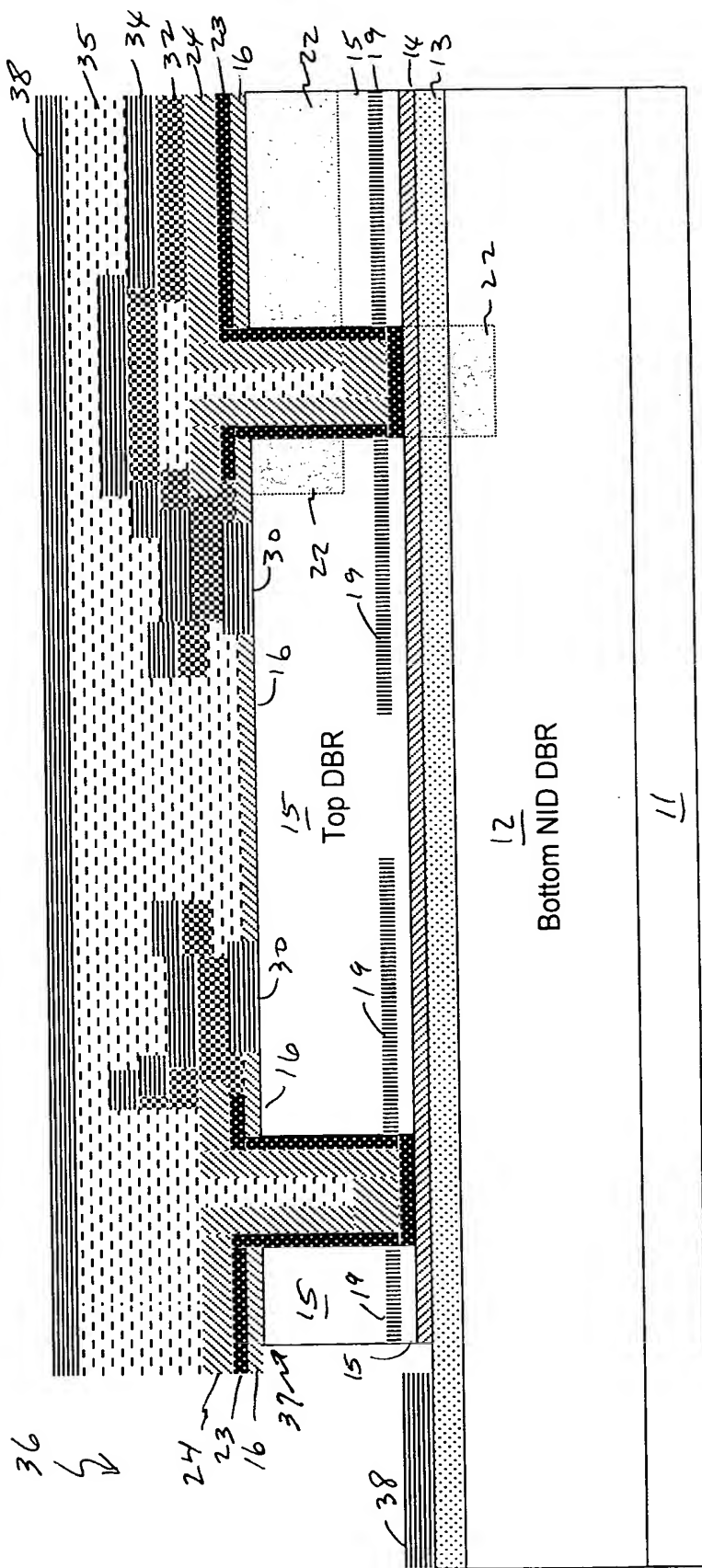


FIGURE 31

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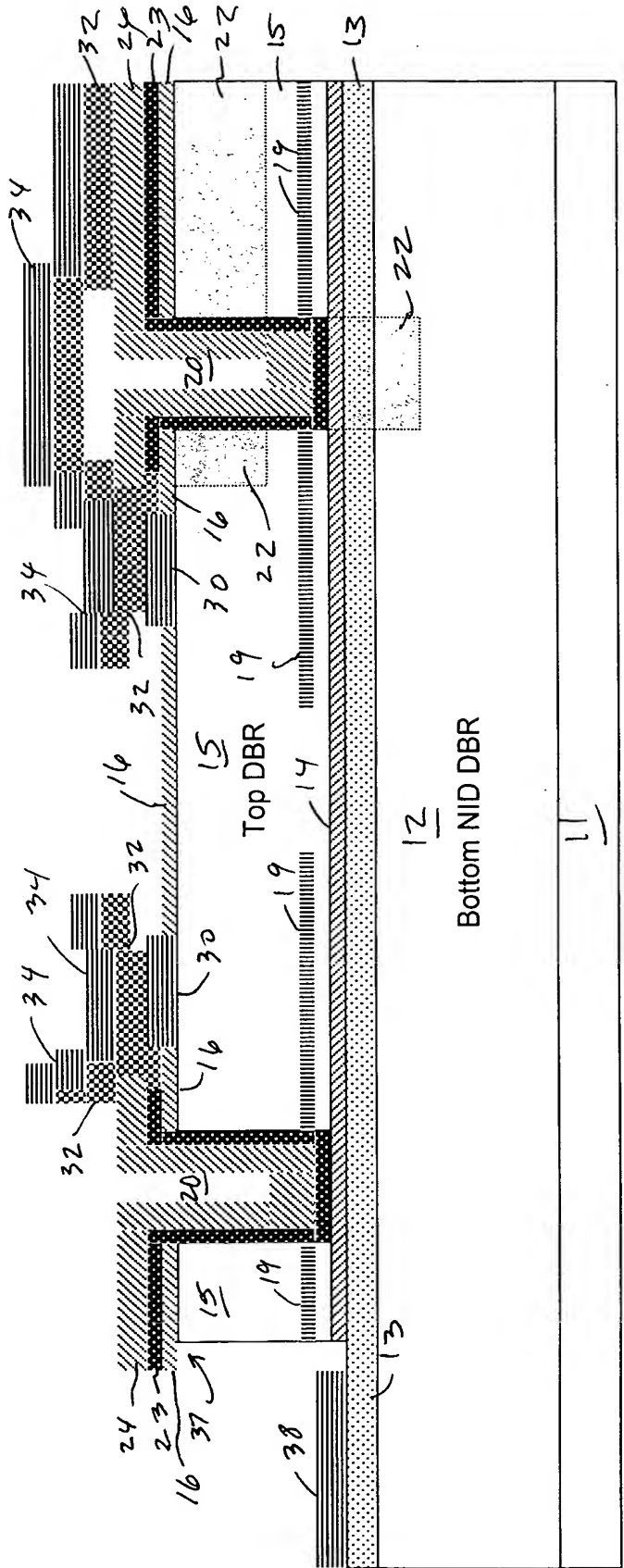


FIGURE 32

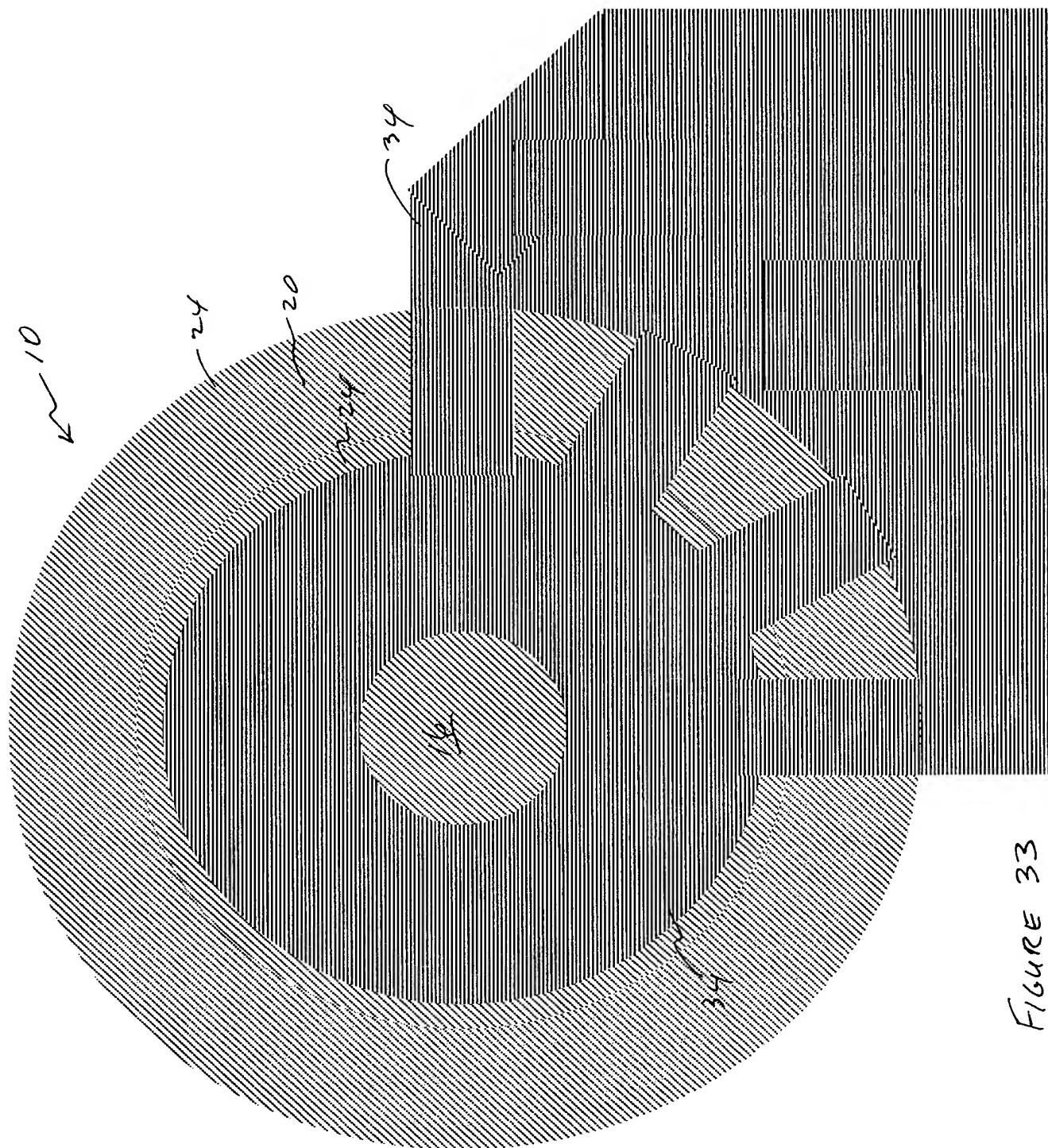


FIGURE 33

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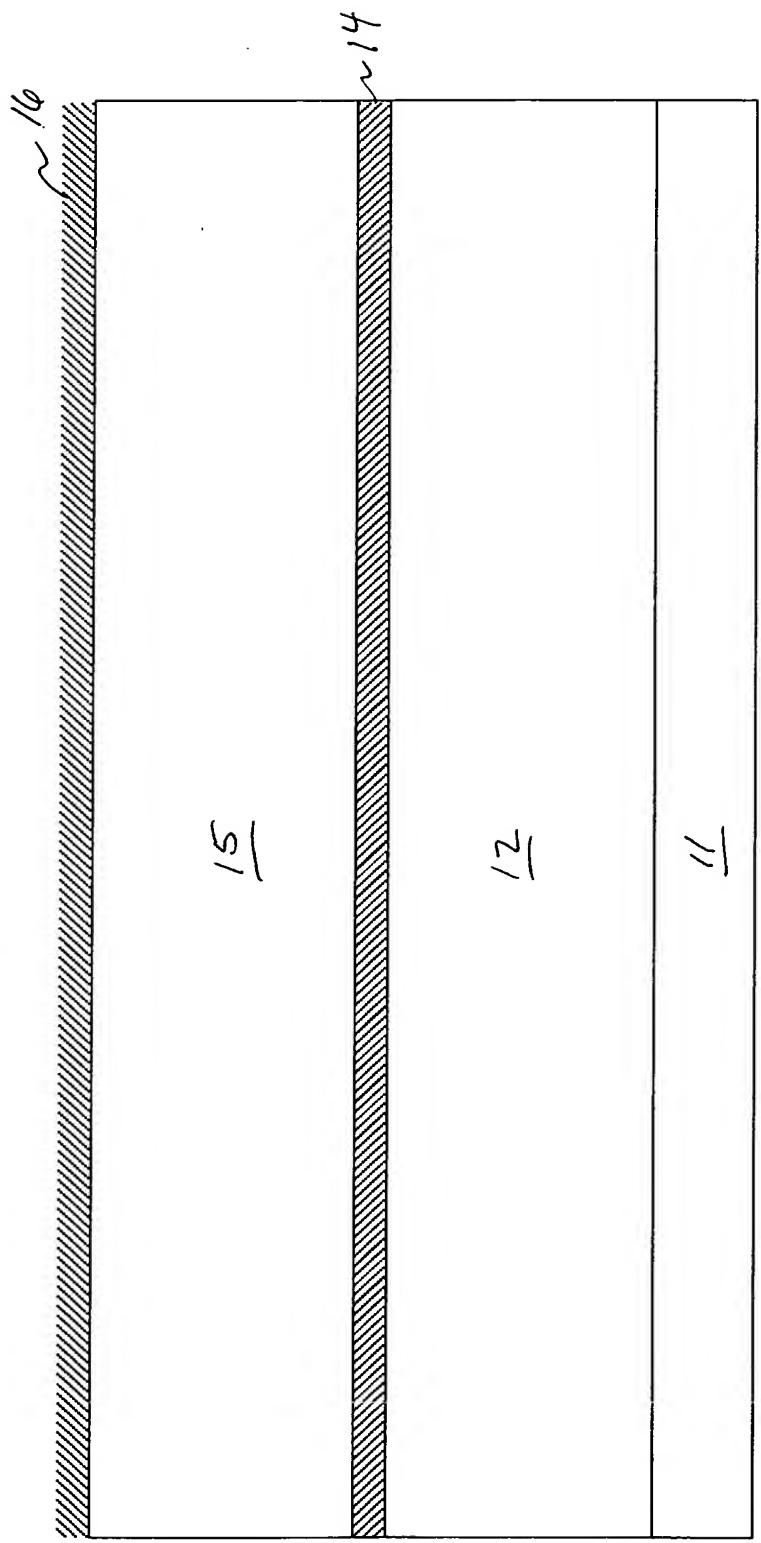


FIGURE 34

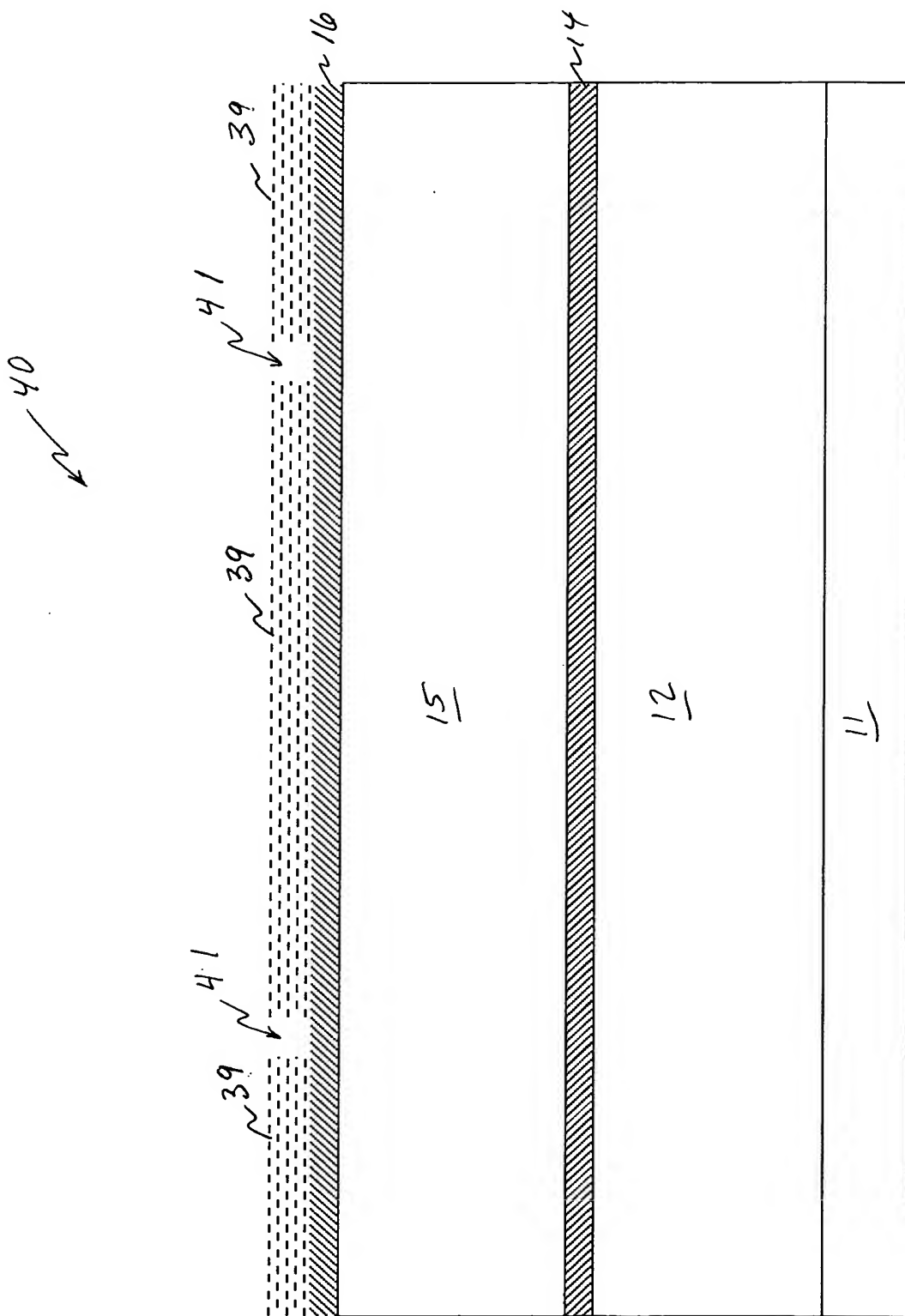


FIGURE 35

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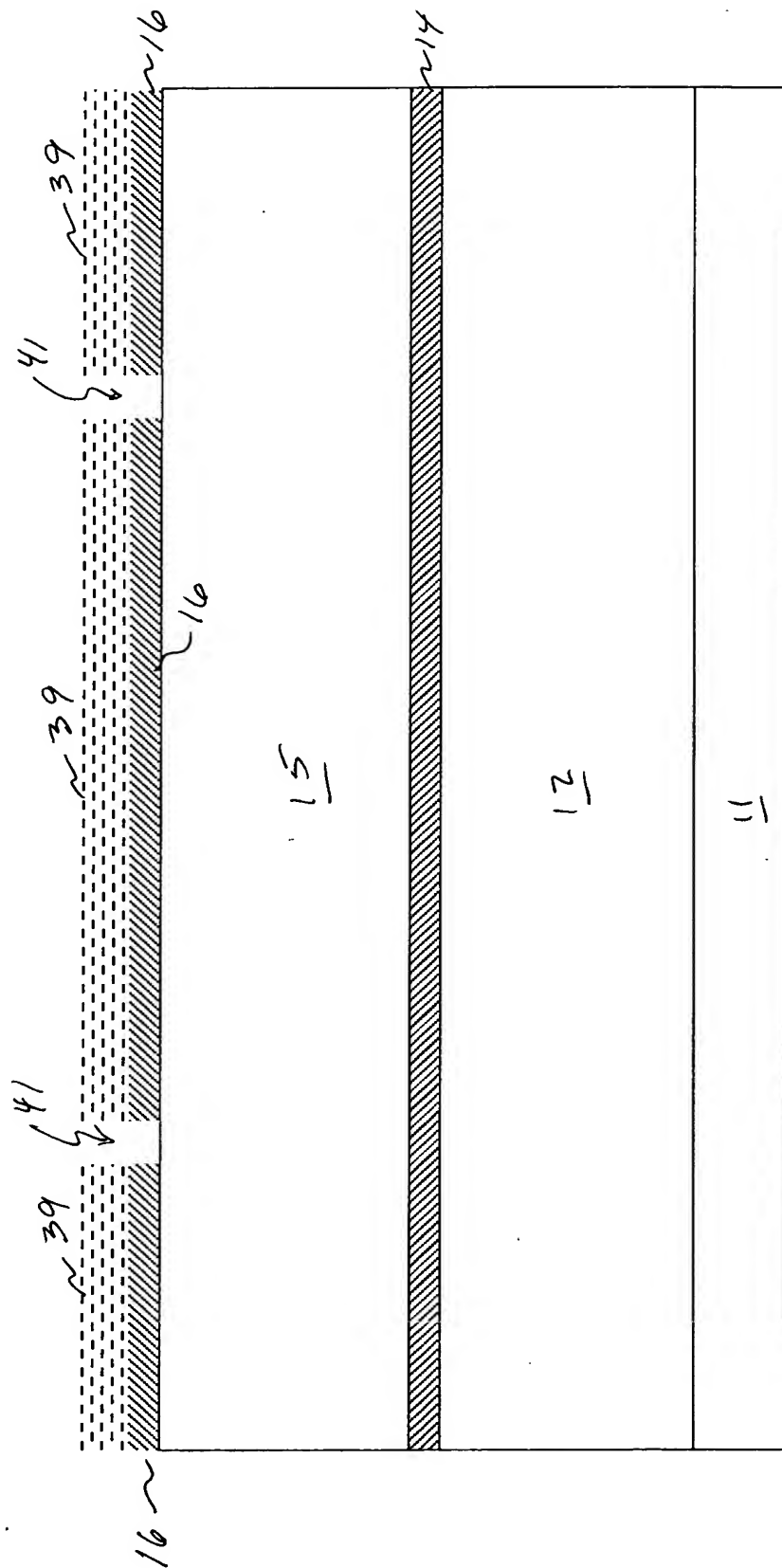


FIGURE 36

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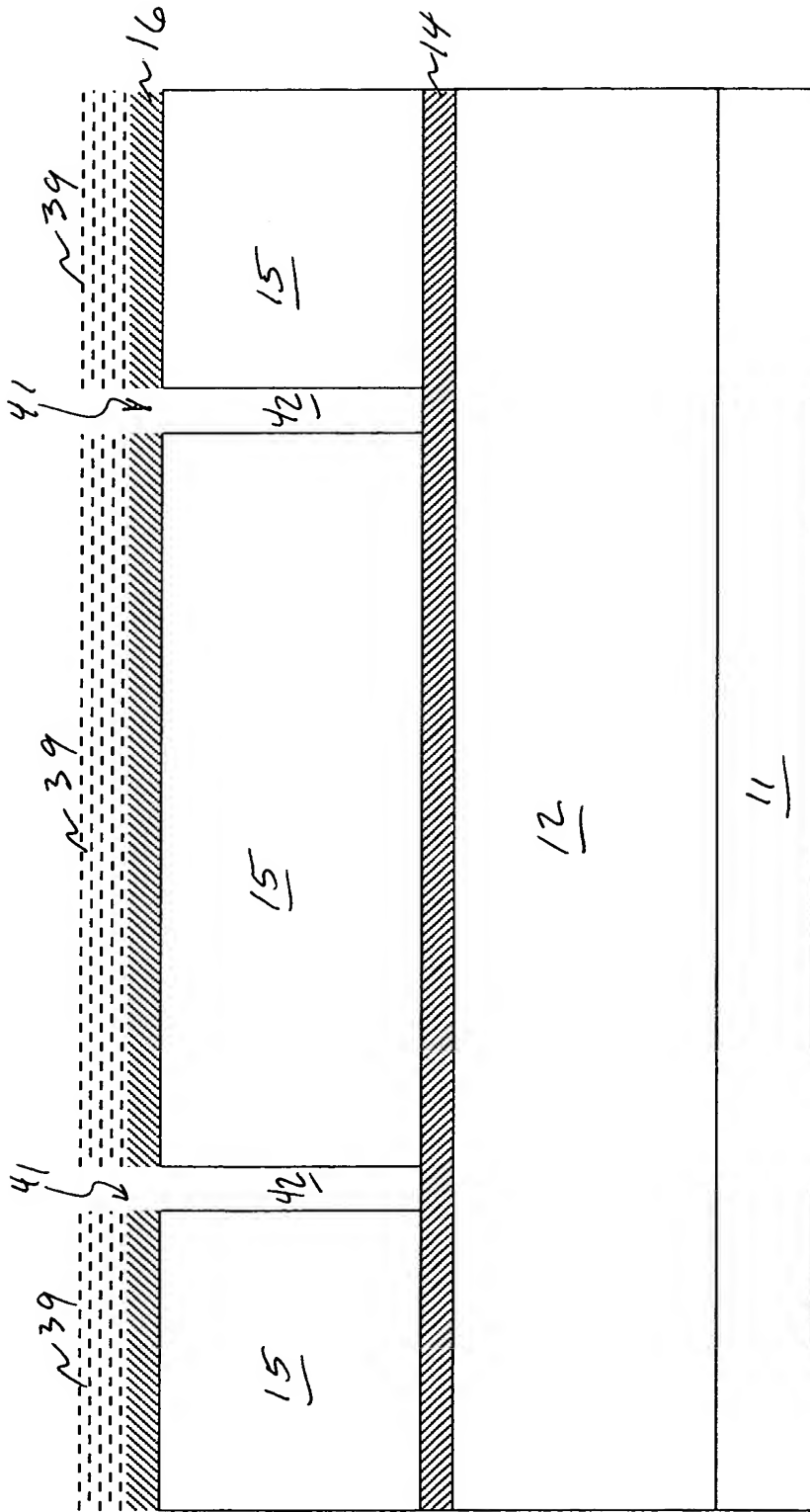


FIGURE 37

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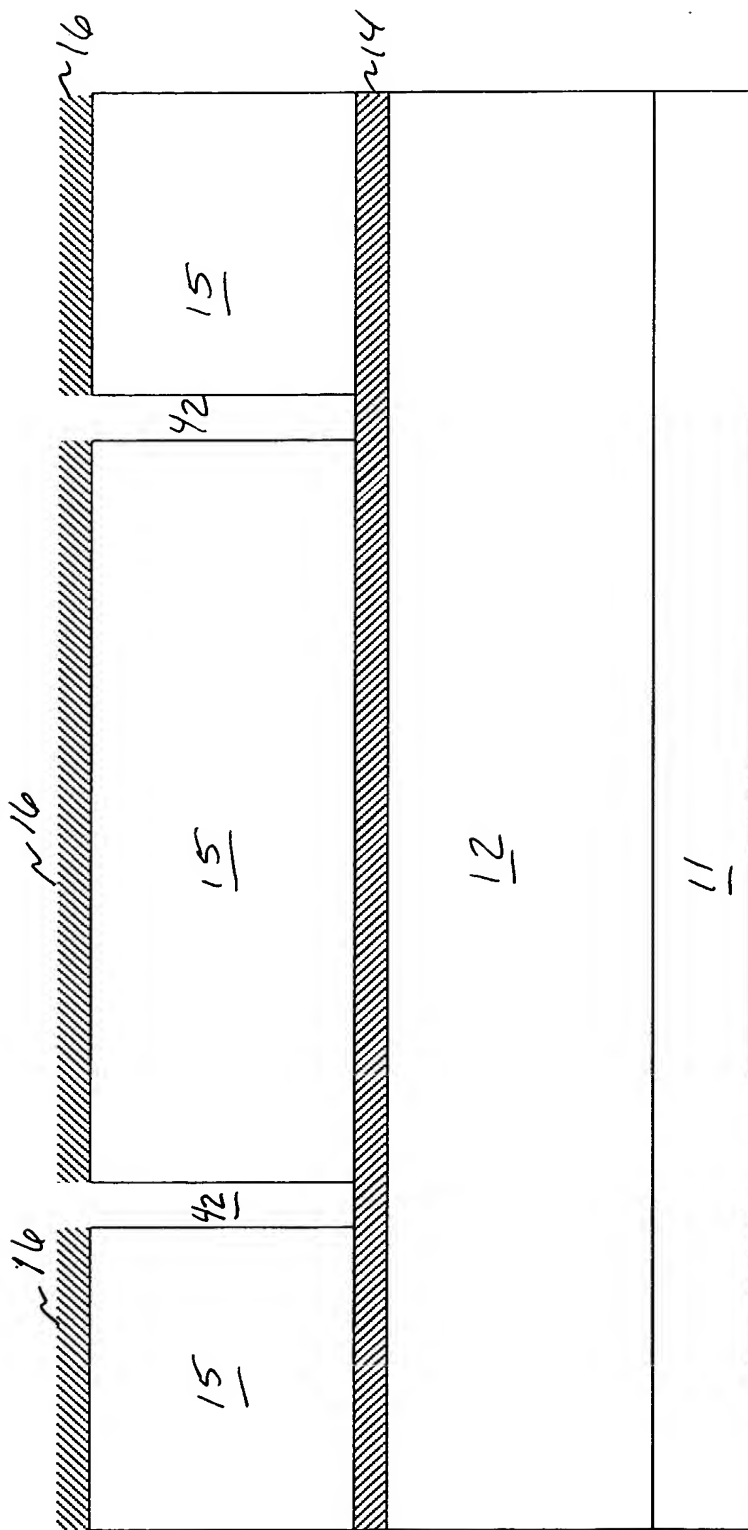


FIGURE 38

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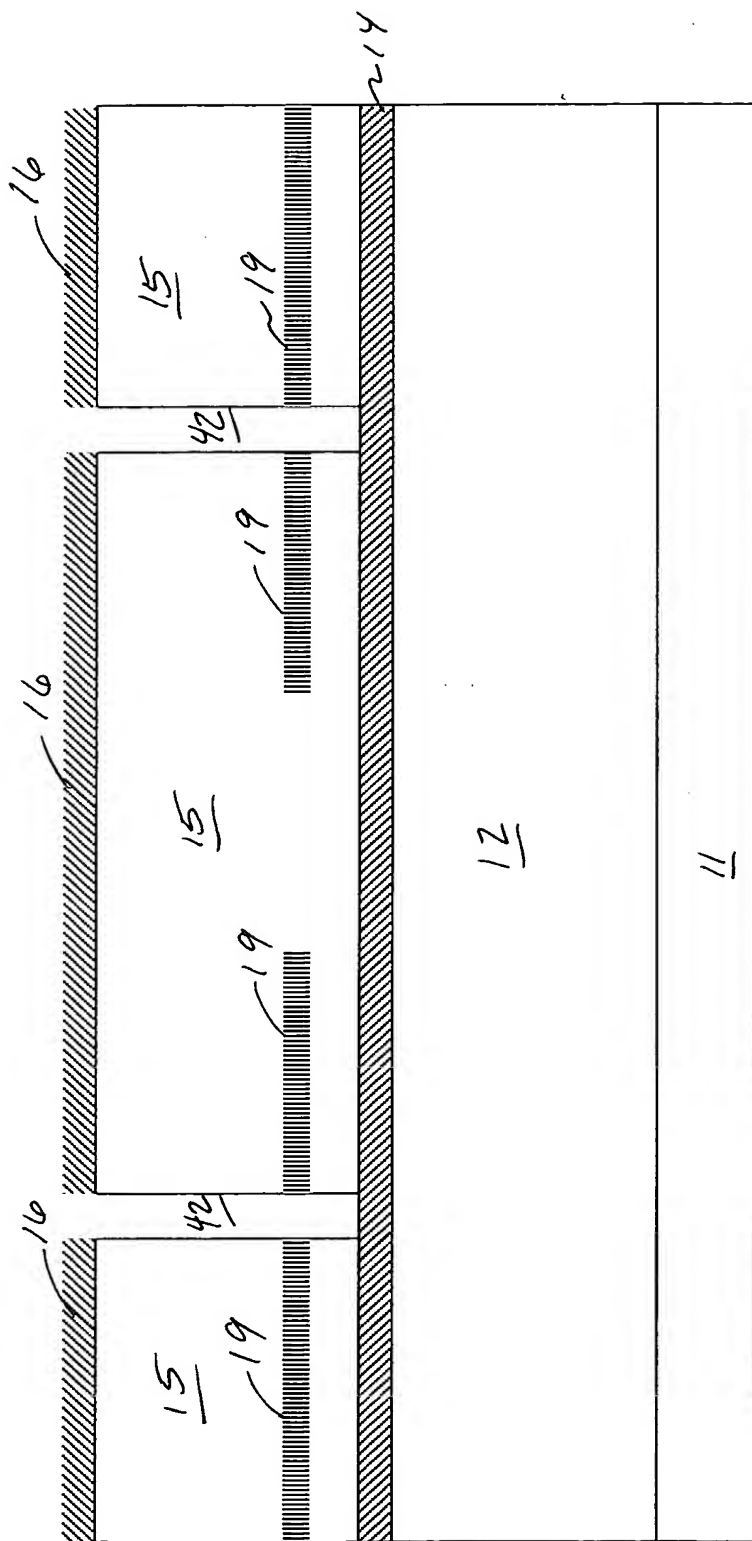


FIGURE 39

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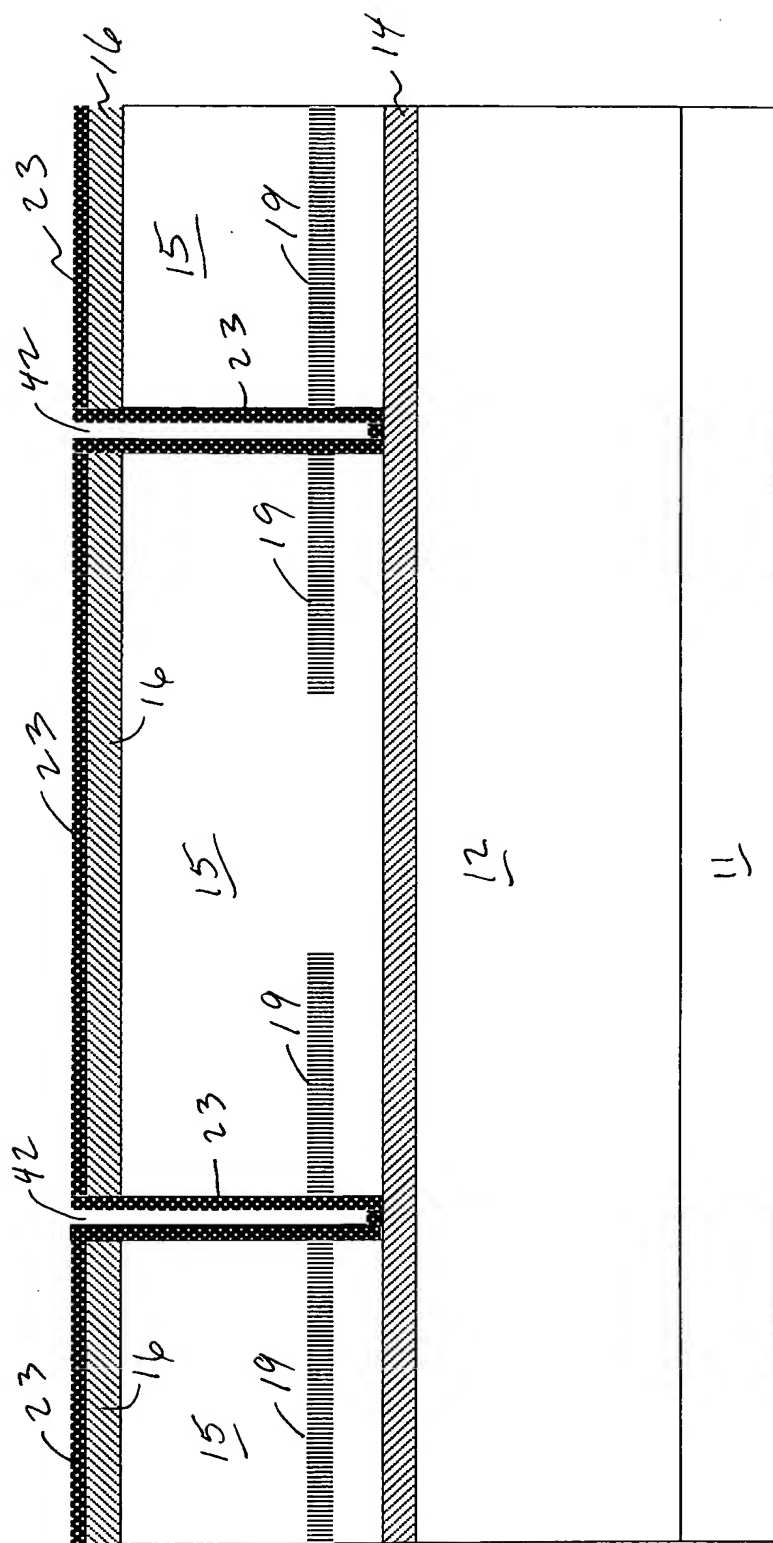


FIGURE 40

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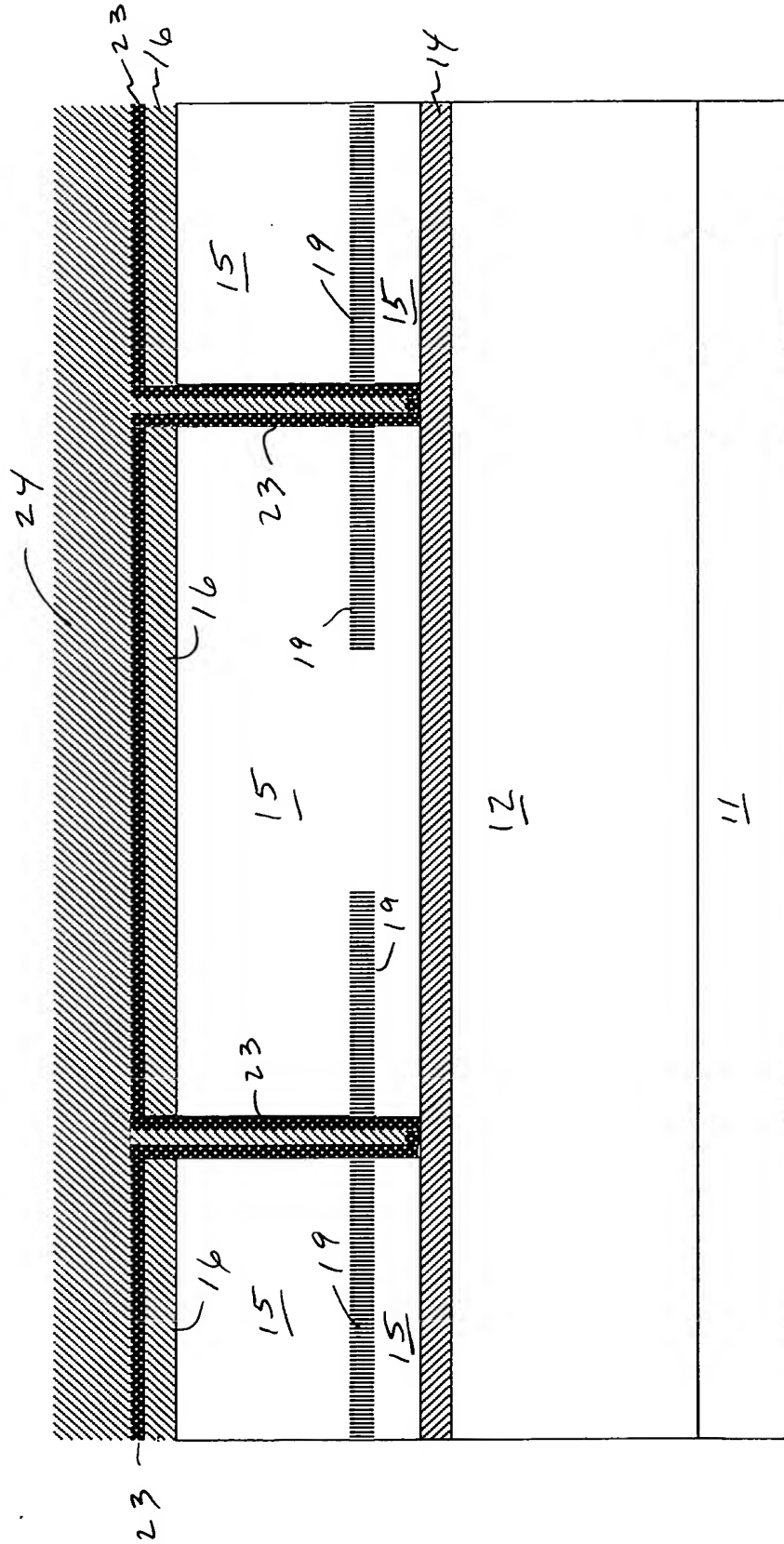


FIGURE 41

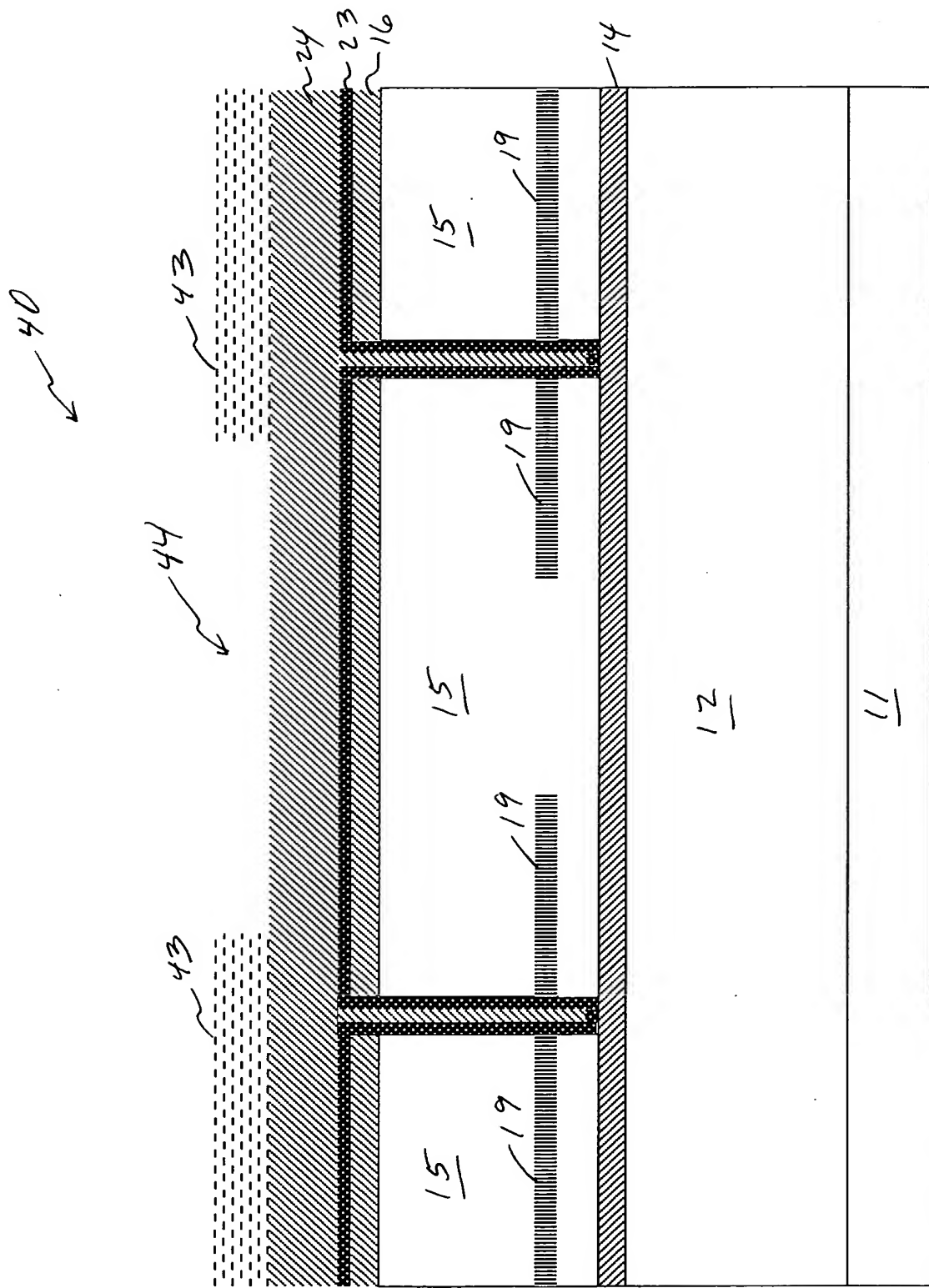


FIGURE 42

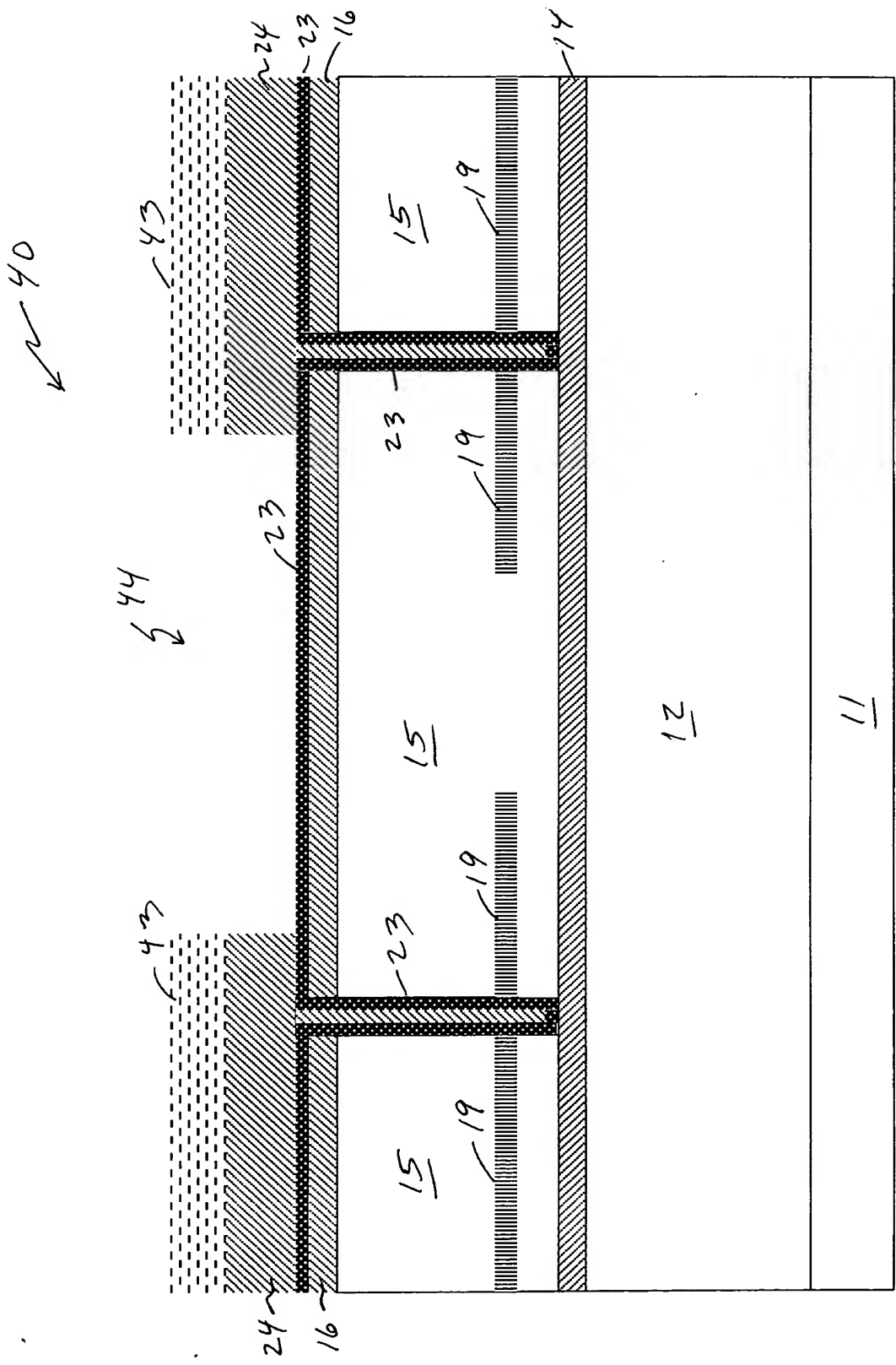
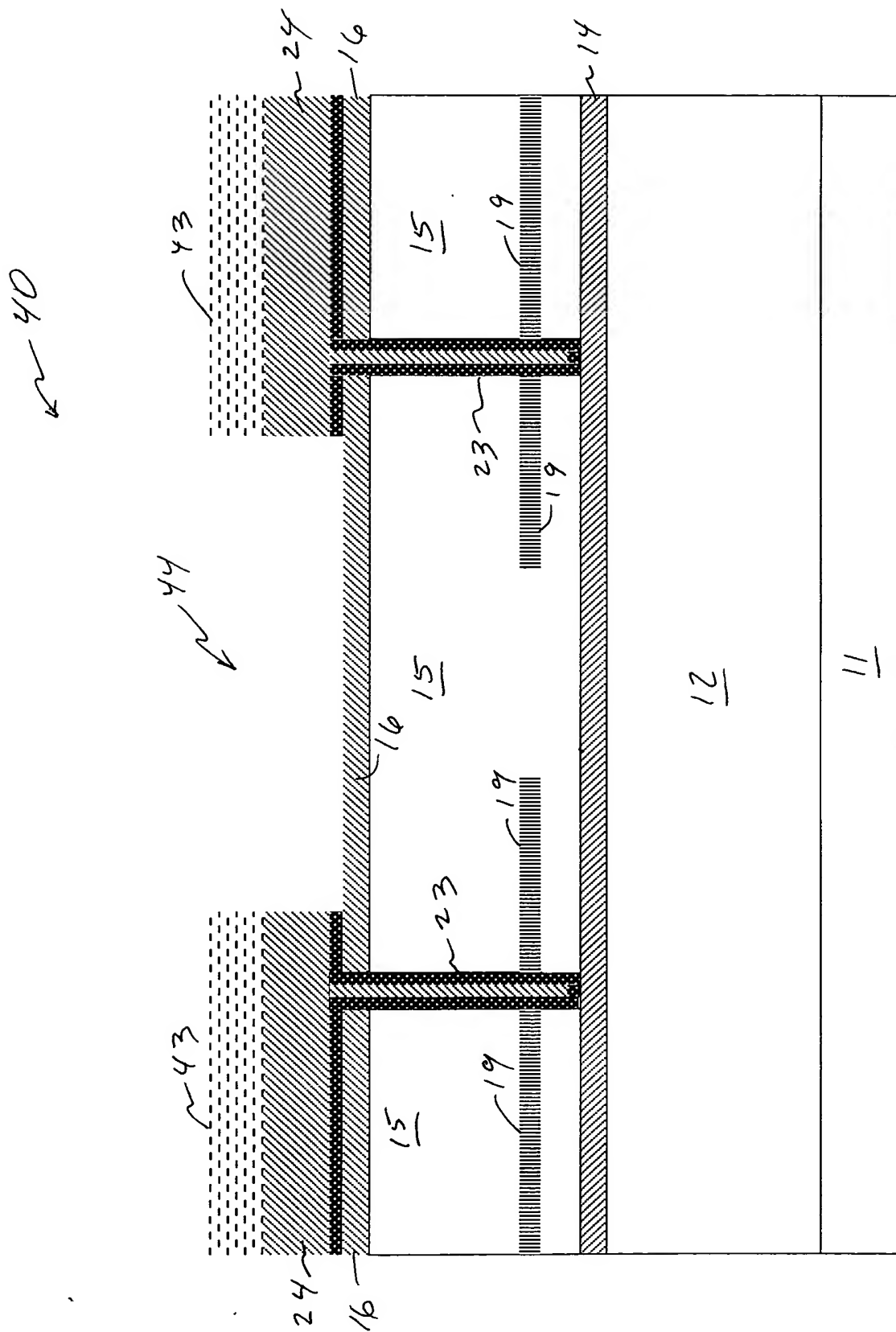


FIGURE 43



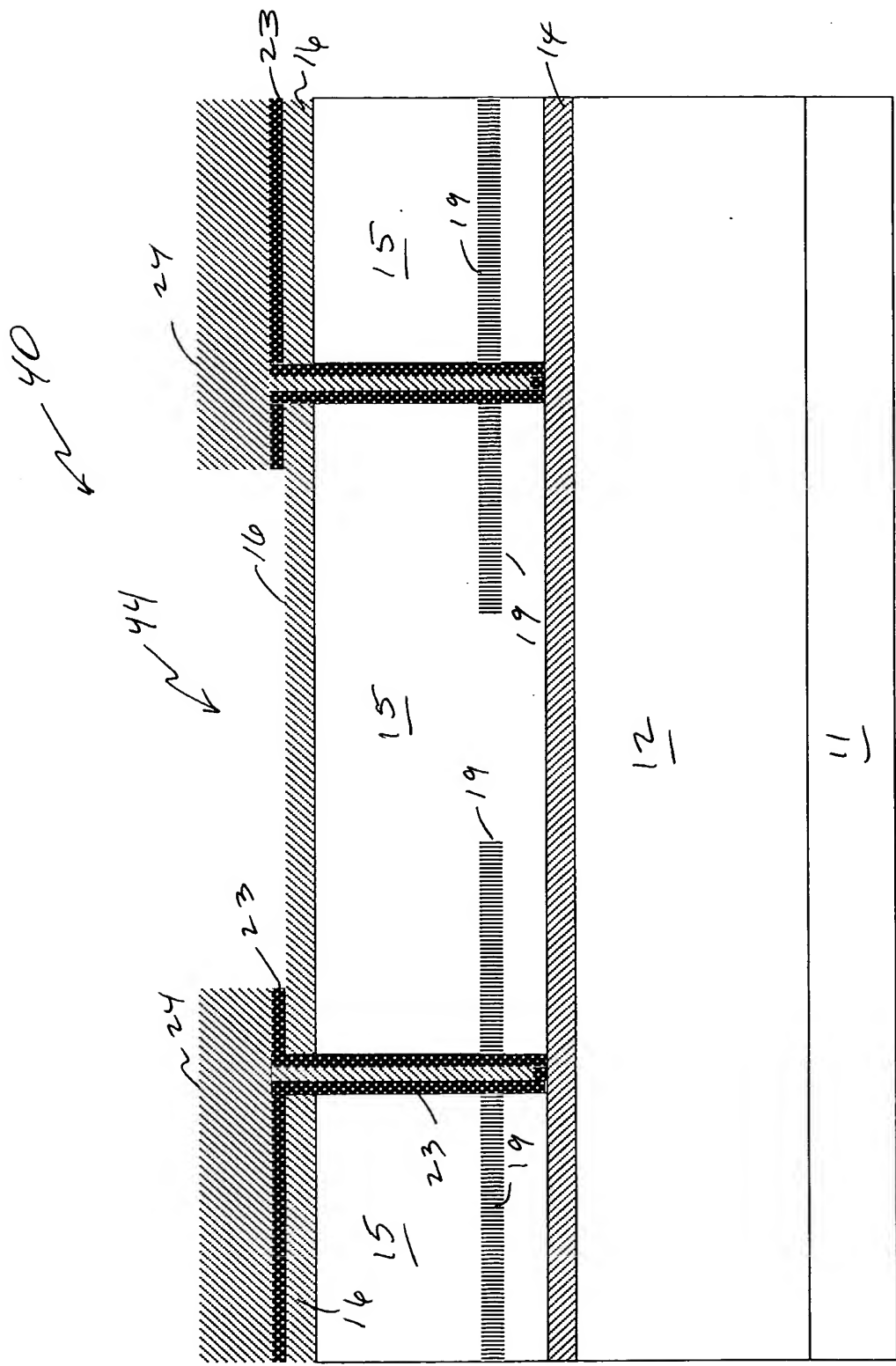


FIGURE 45

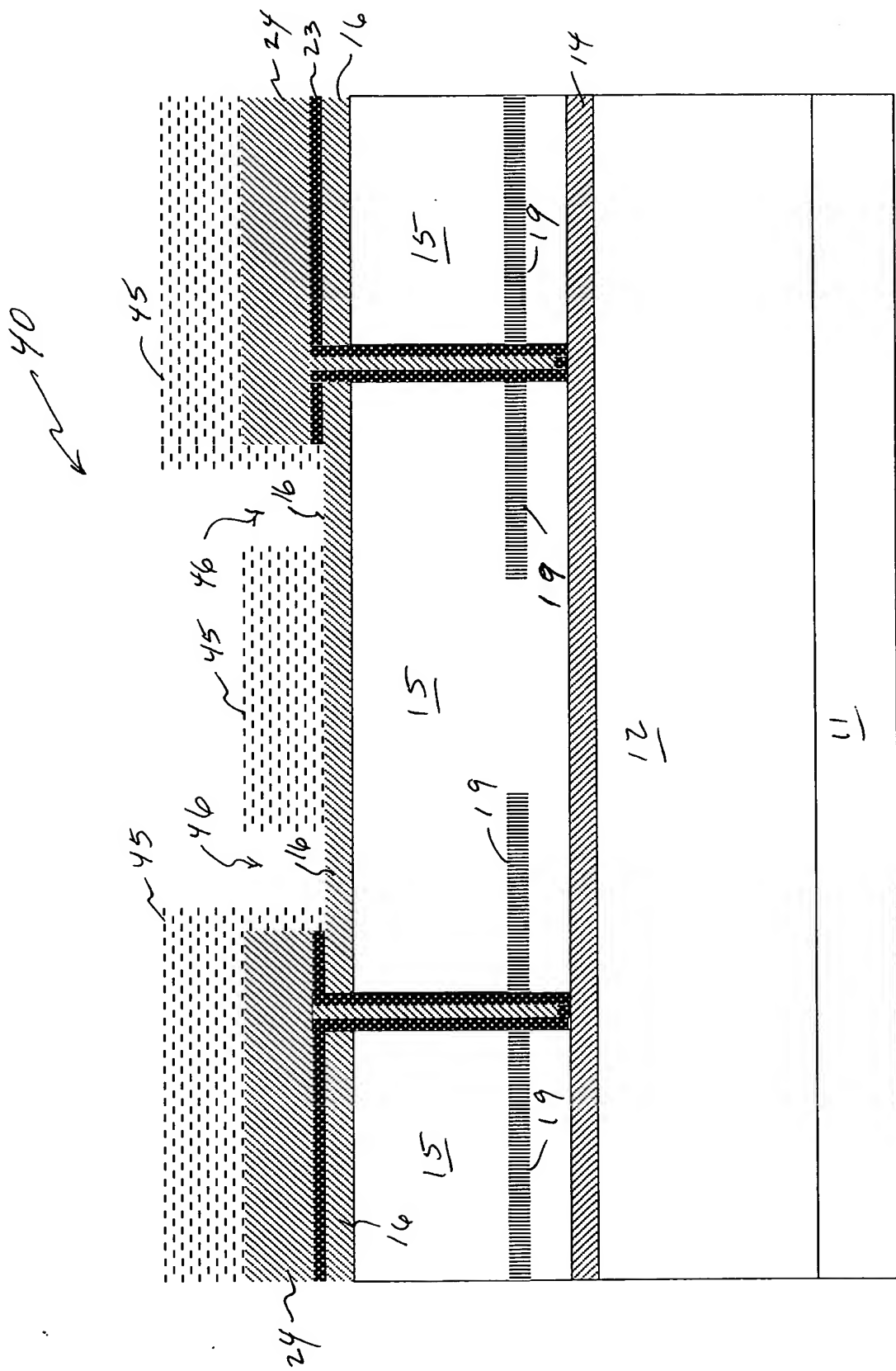


FIGURE 46

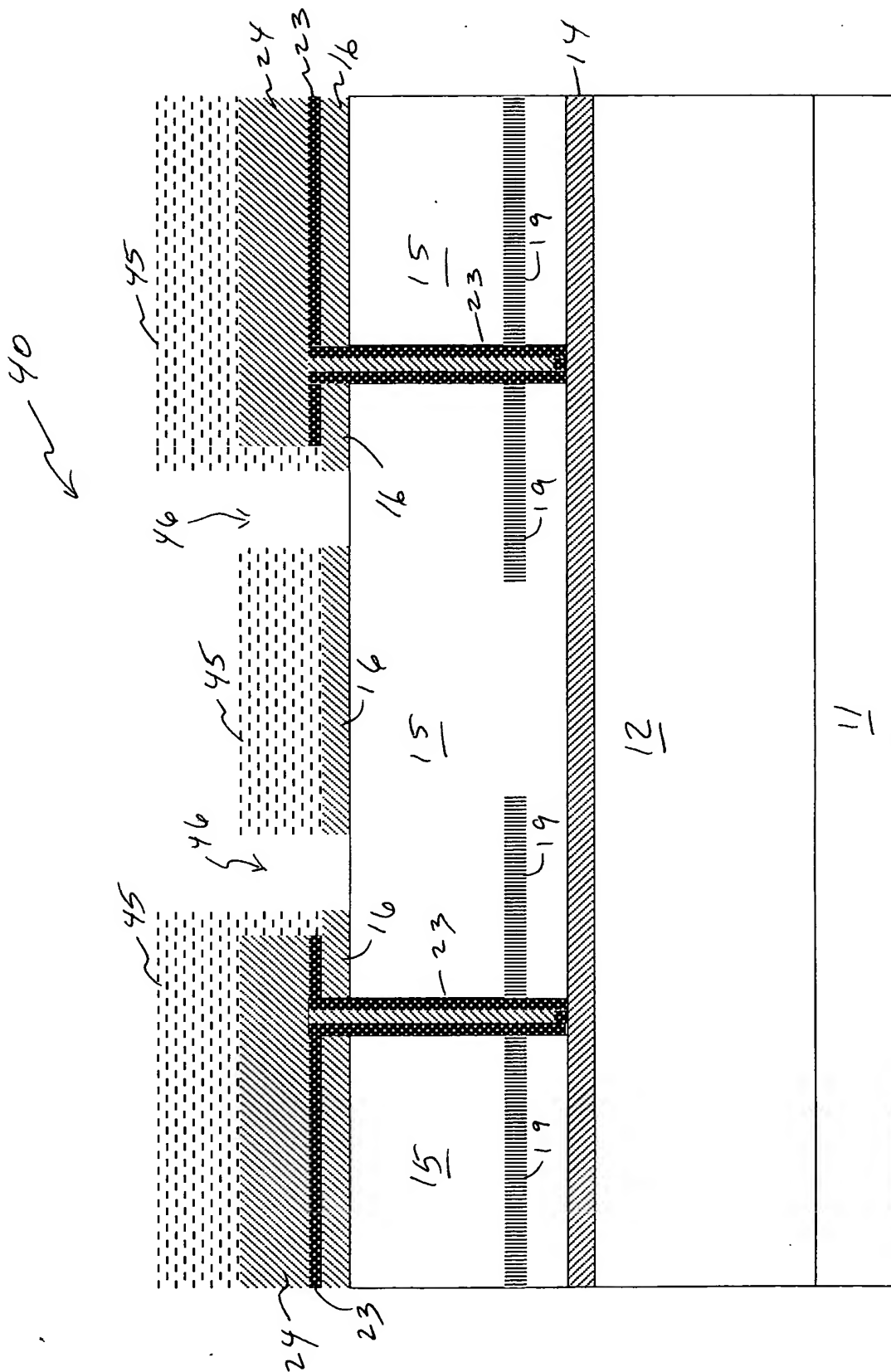


FIGURE 47

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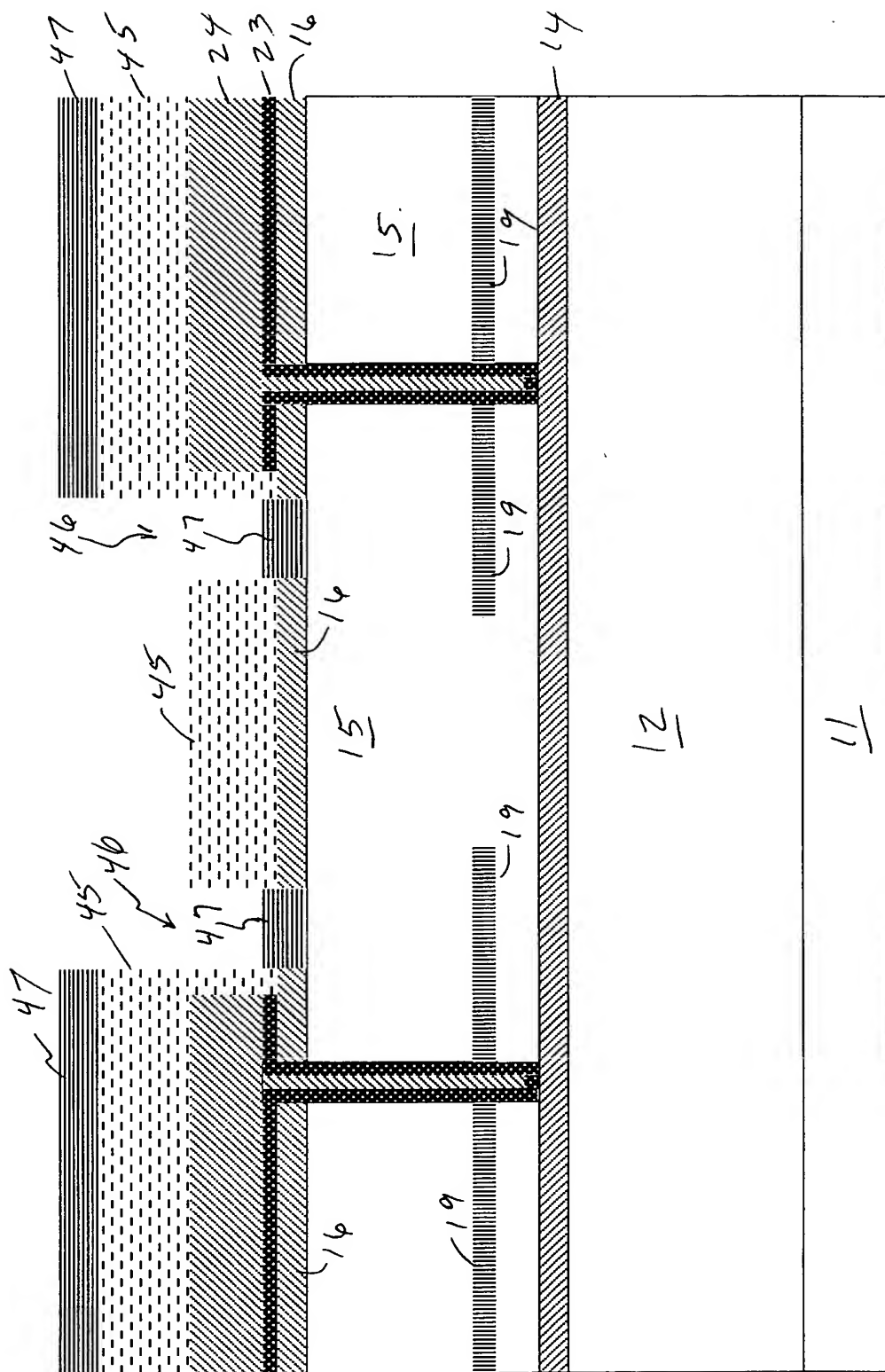


FIGURE 48

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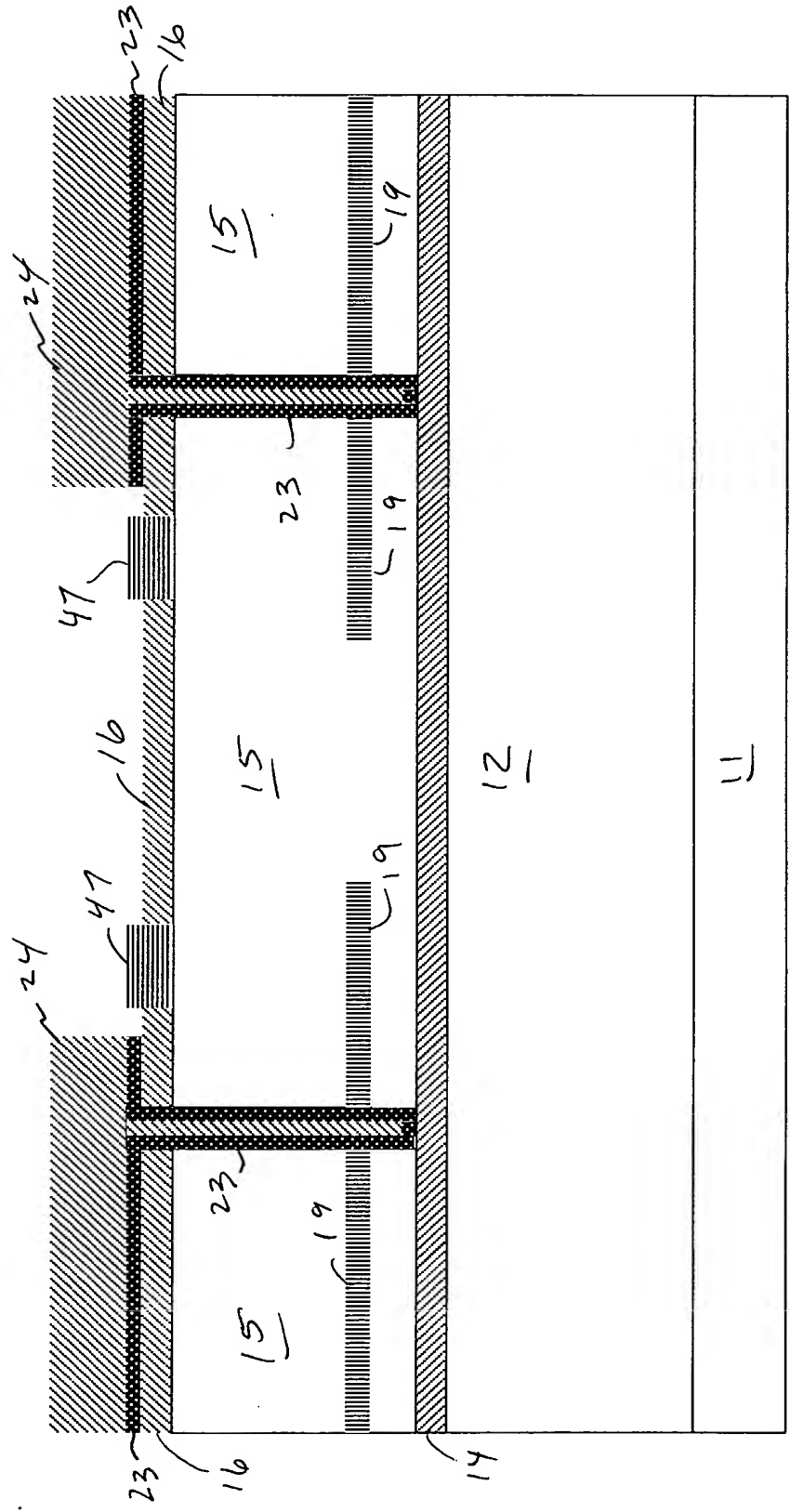


FIGURE 49

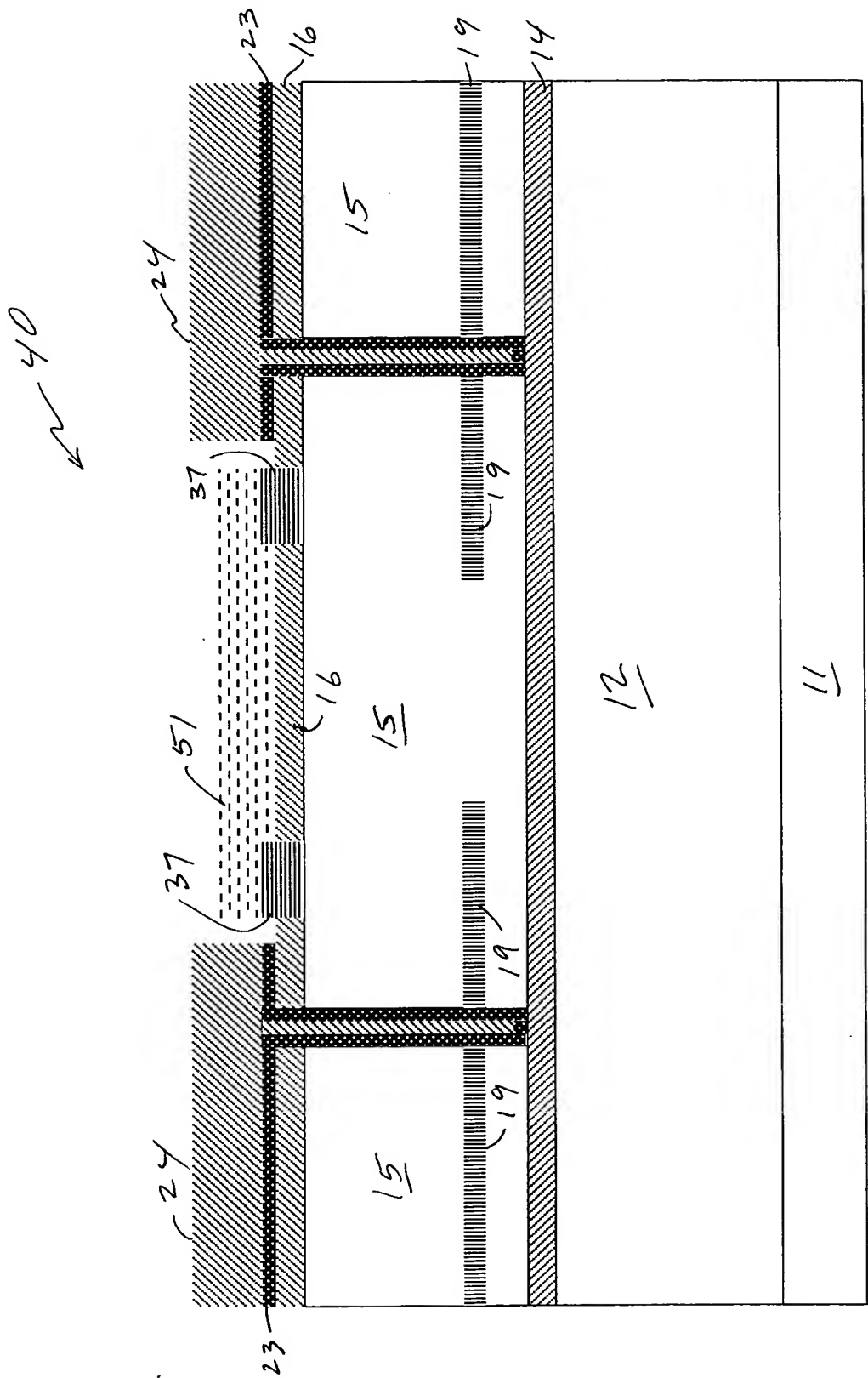


FIGURE 50

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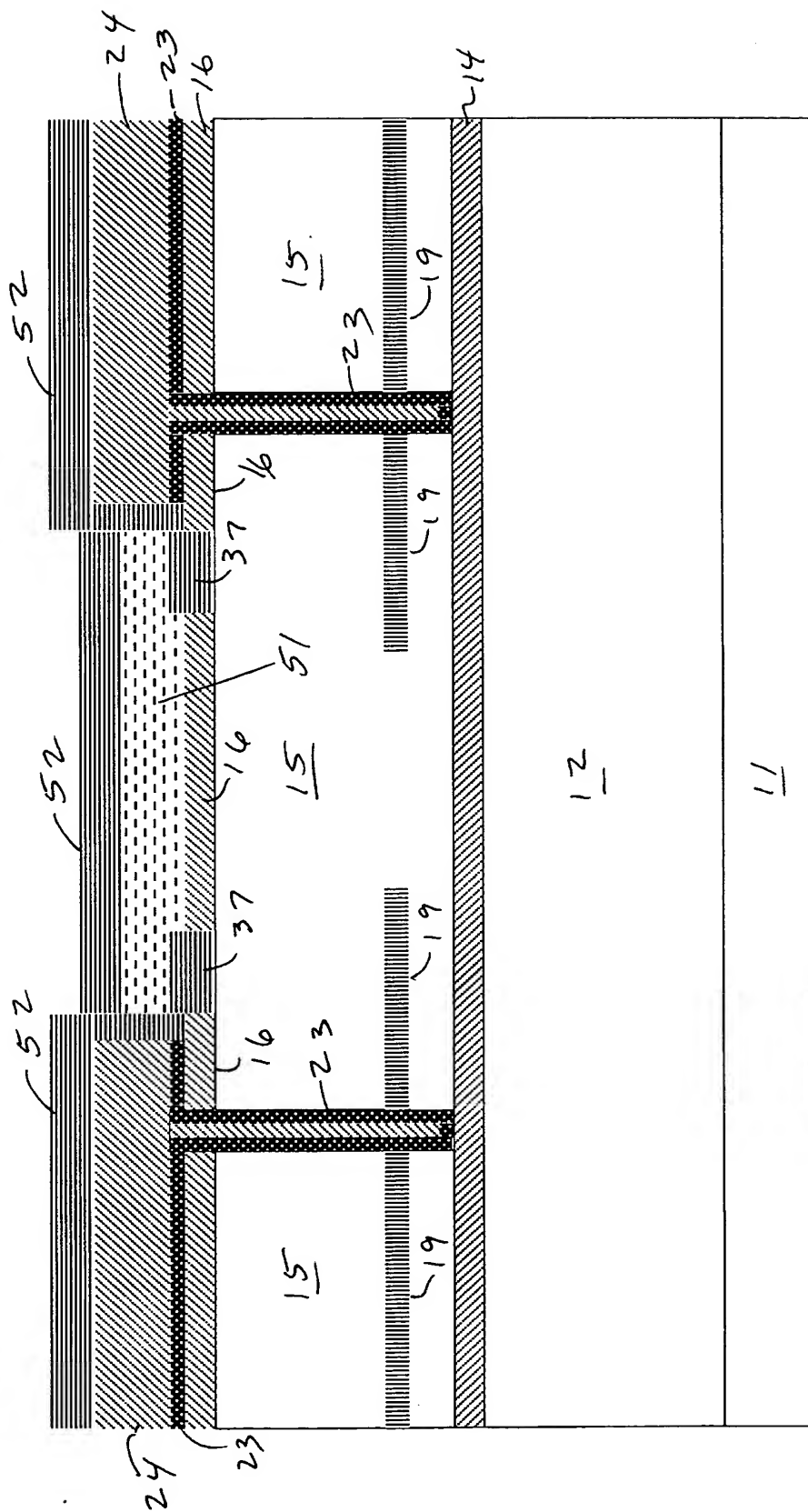


FIGURE 51

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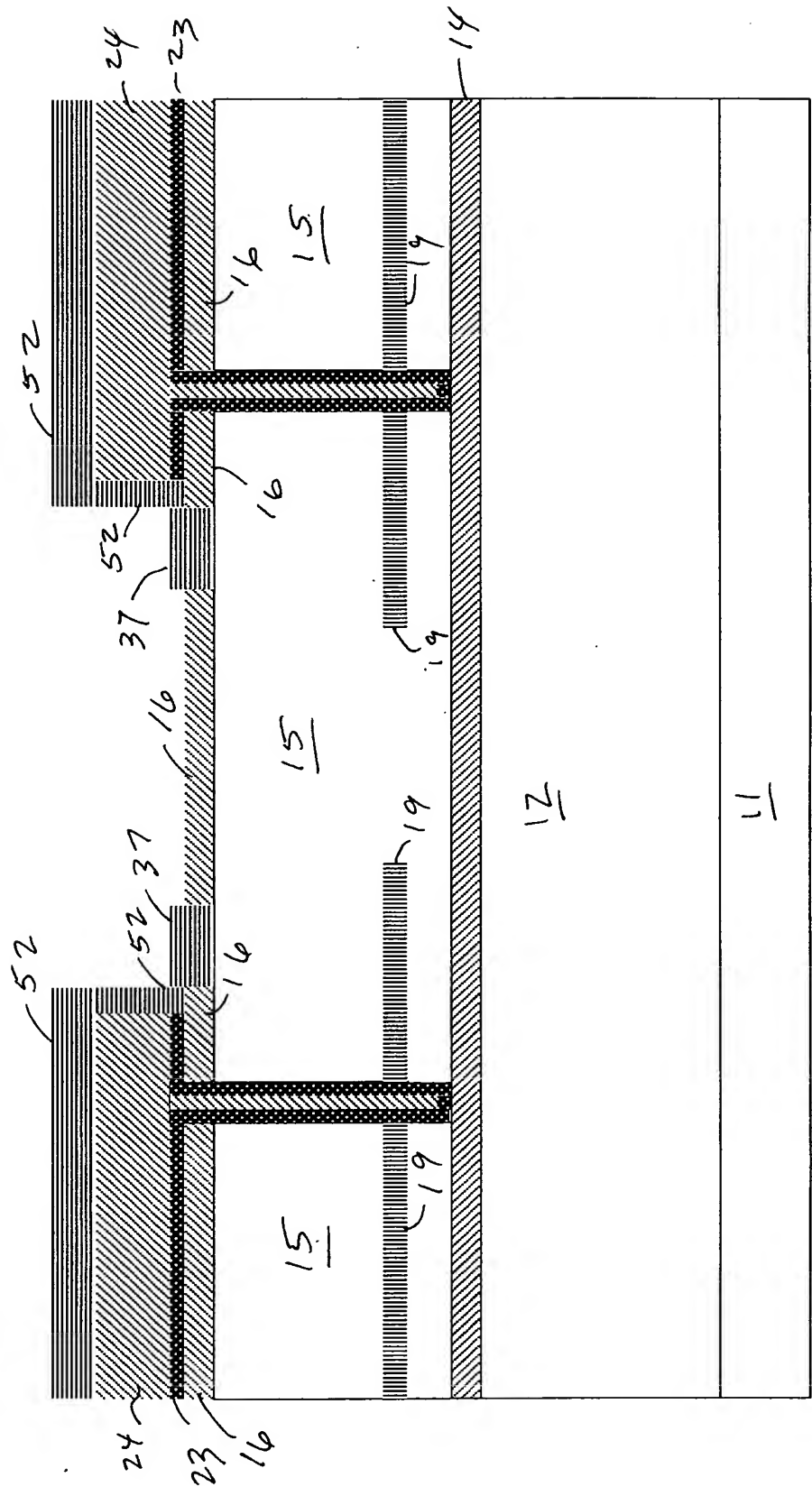


FIGURE 52

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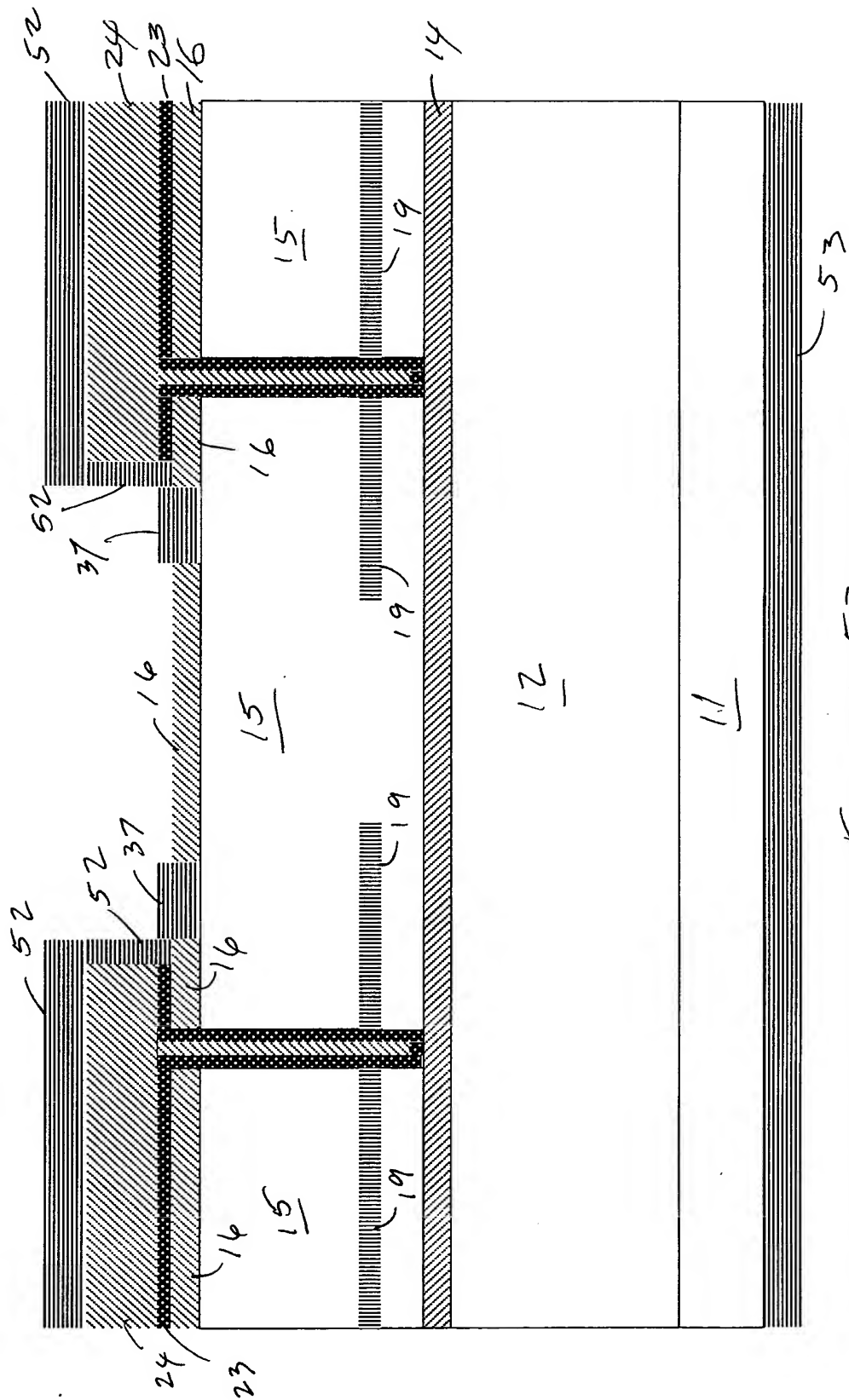


FIGURE 53

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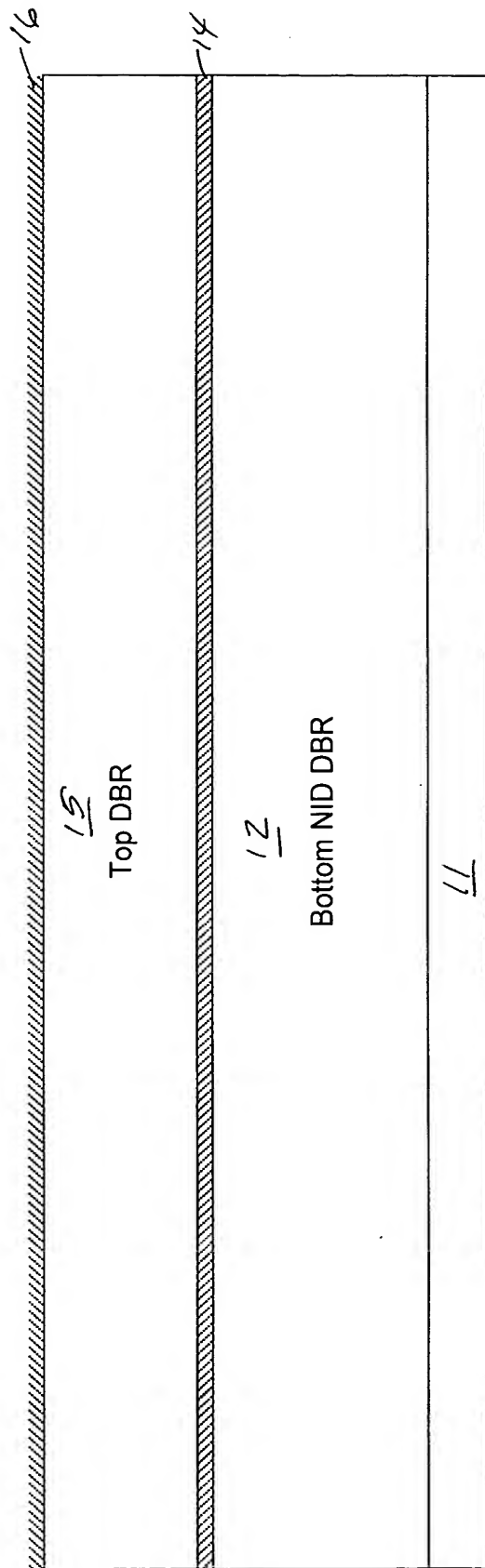
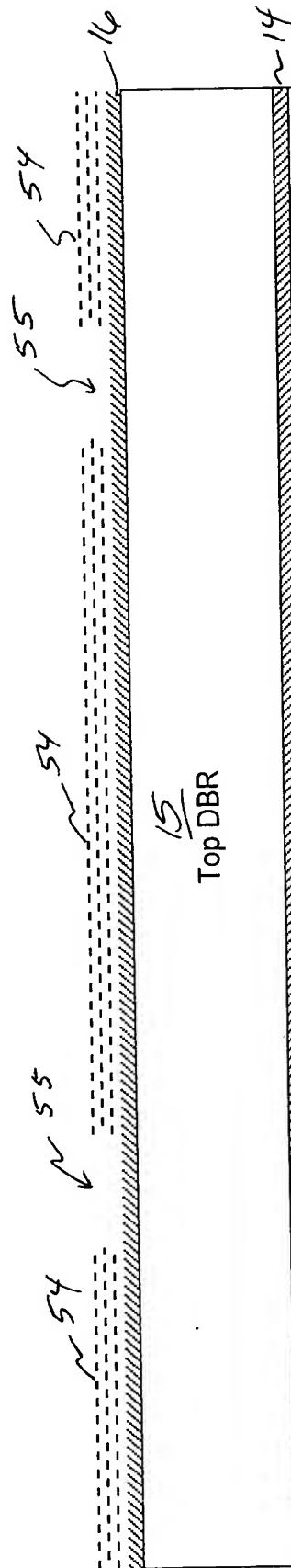


FIGURE 54

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FIGURE 55

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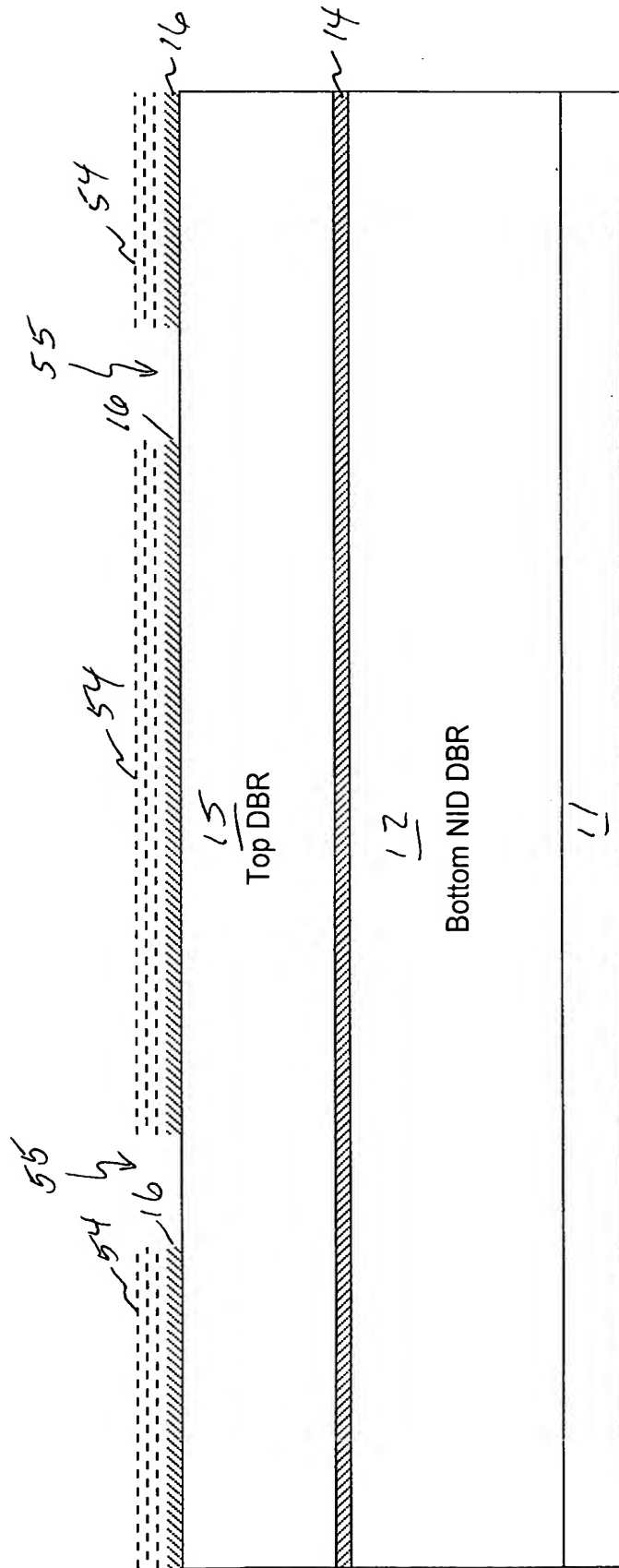


FIGURE 5b

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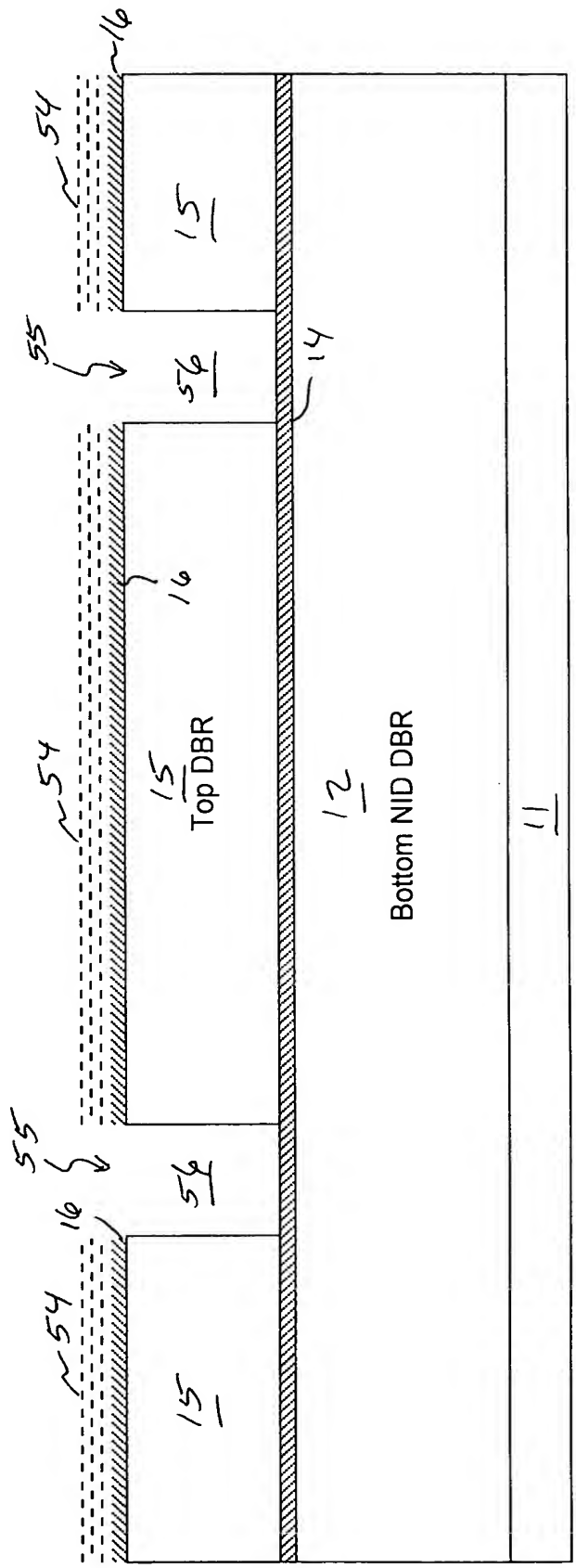


FIGURE 57

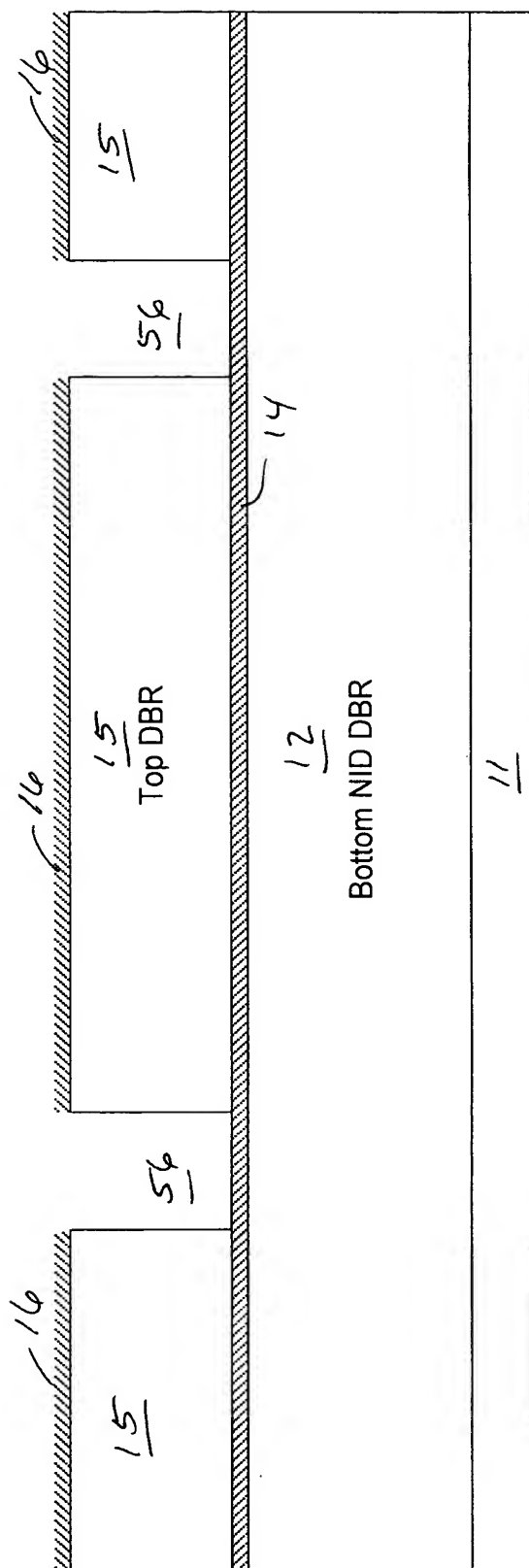


FIGURE 58

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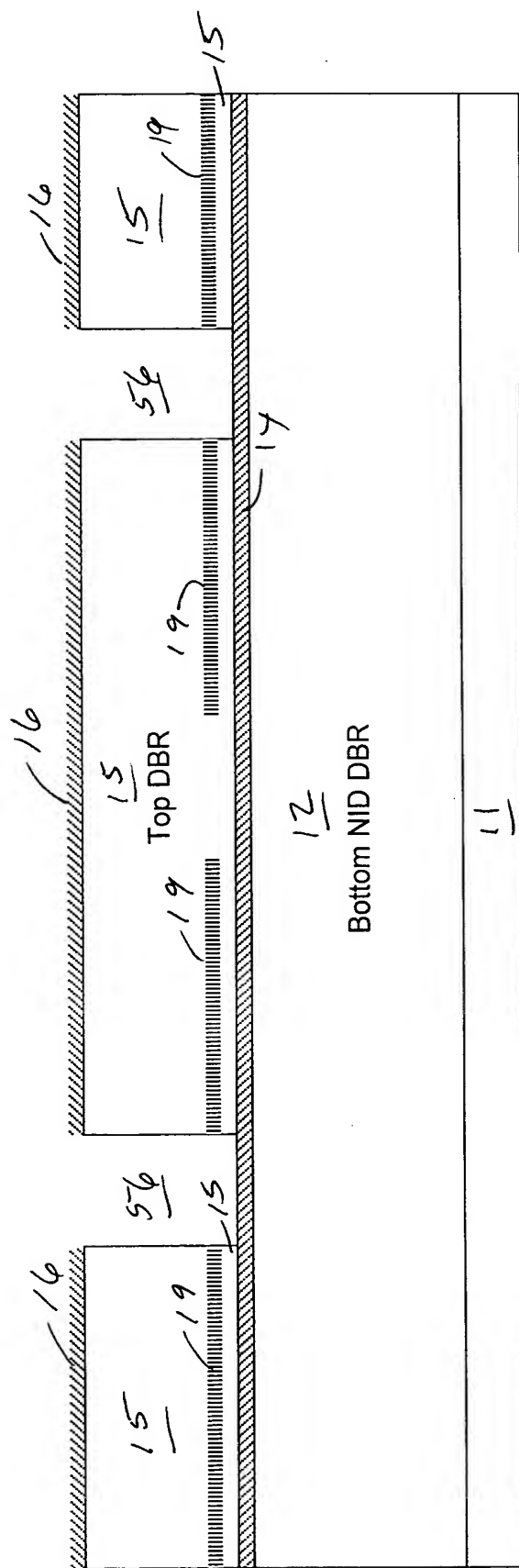


FIGURE 59

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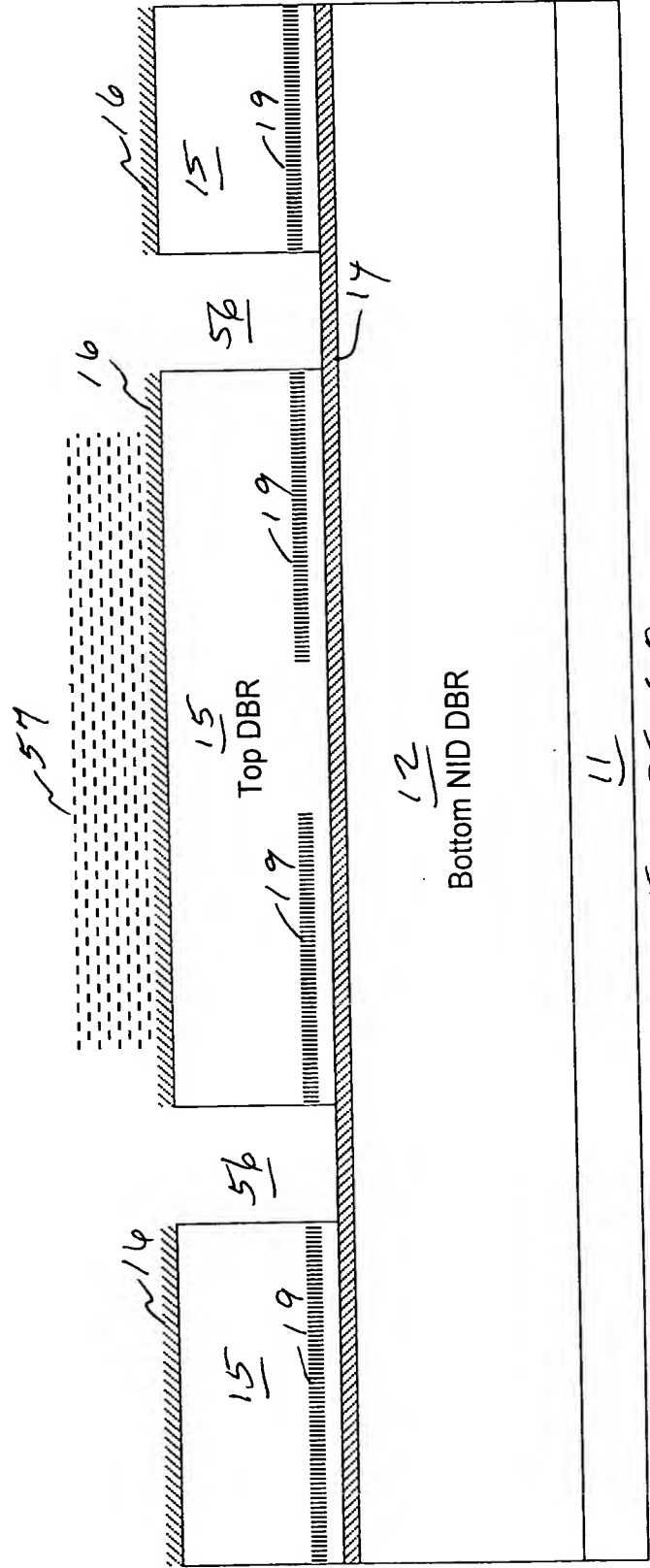
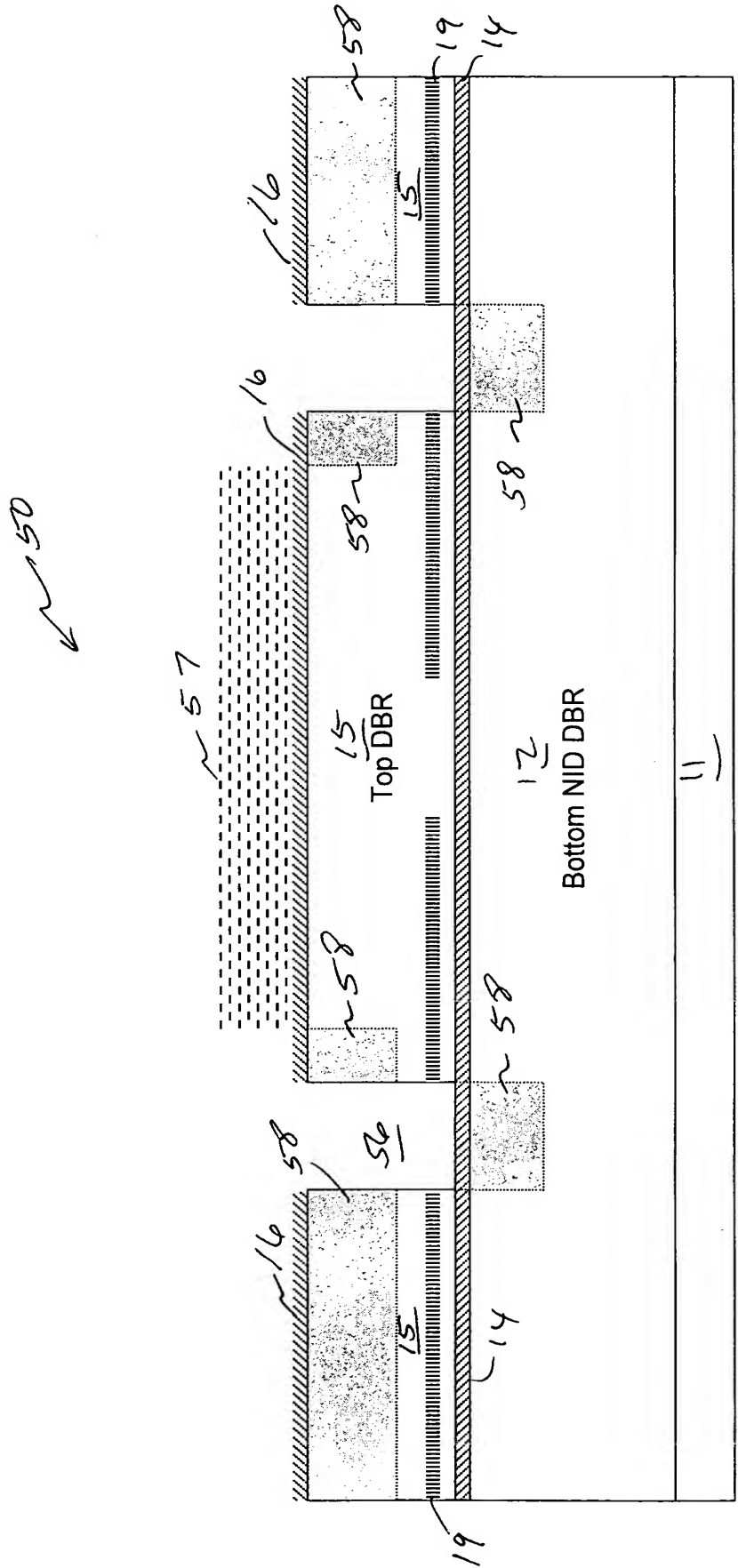


FIGURE 60



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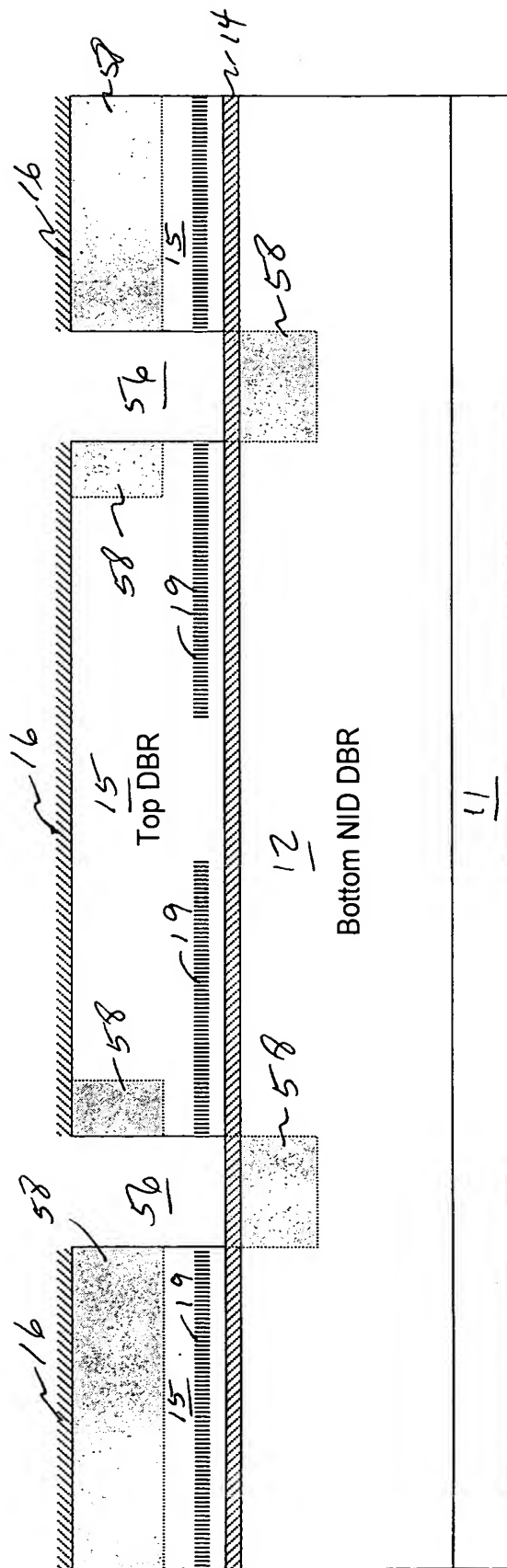


FIGURE 62

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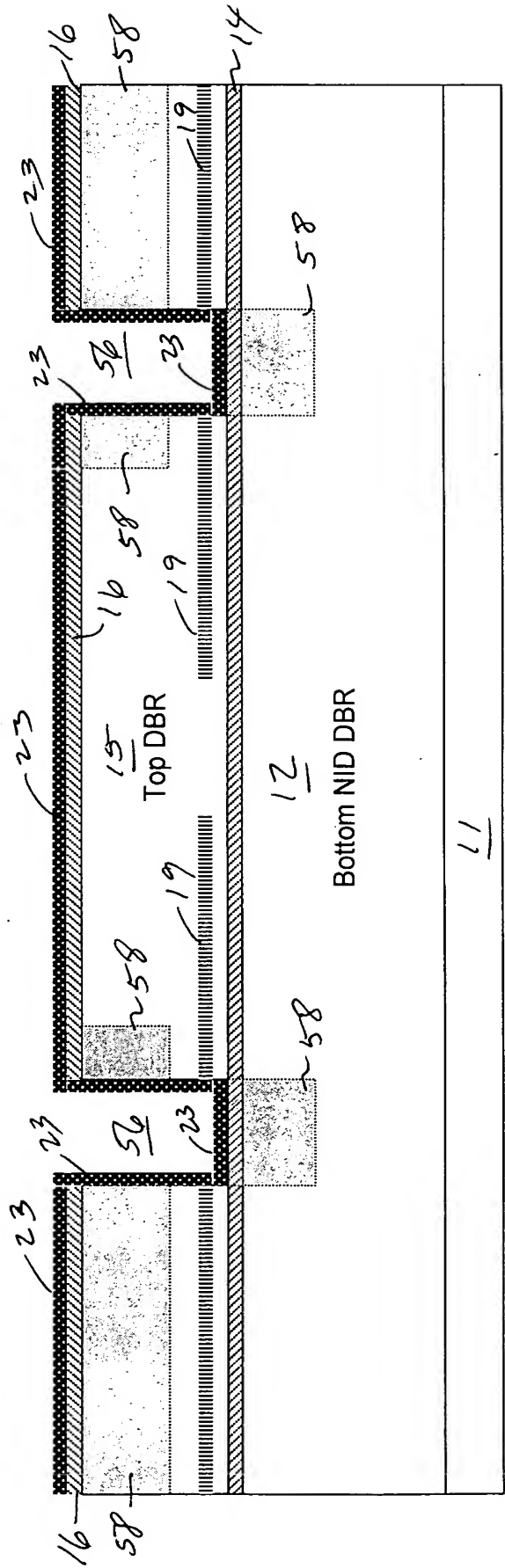
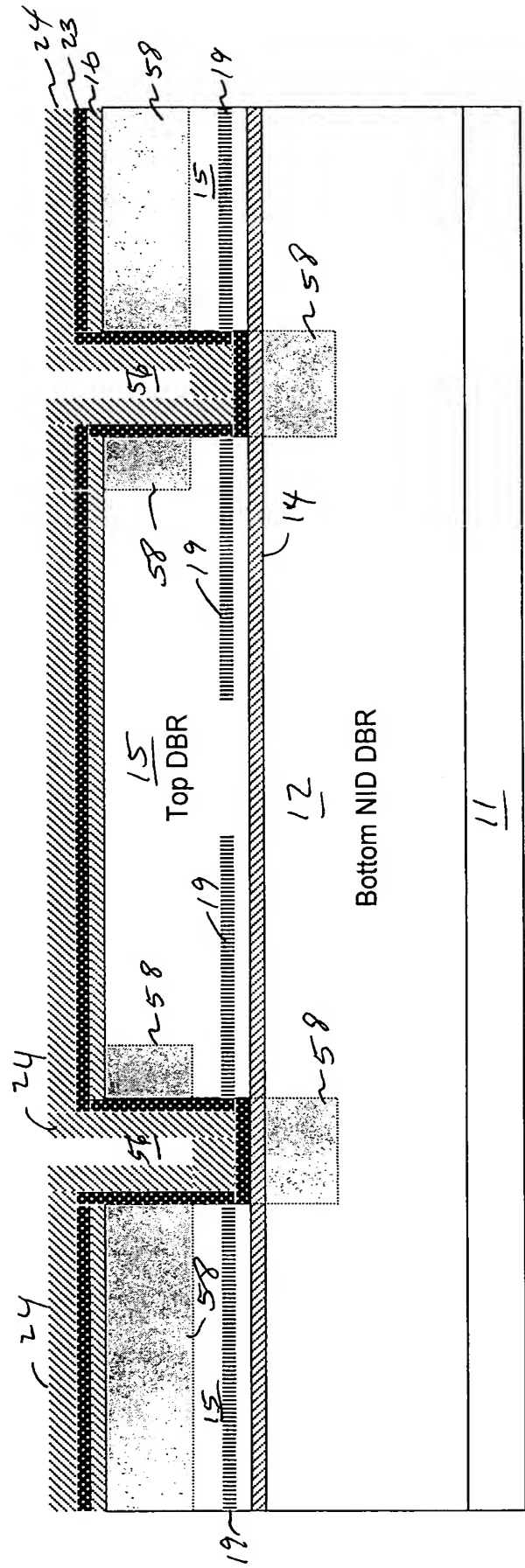


FIGURE 63

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FIGURE 64

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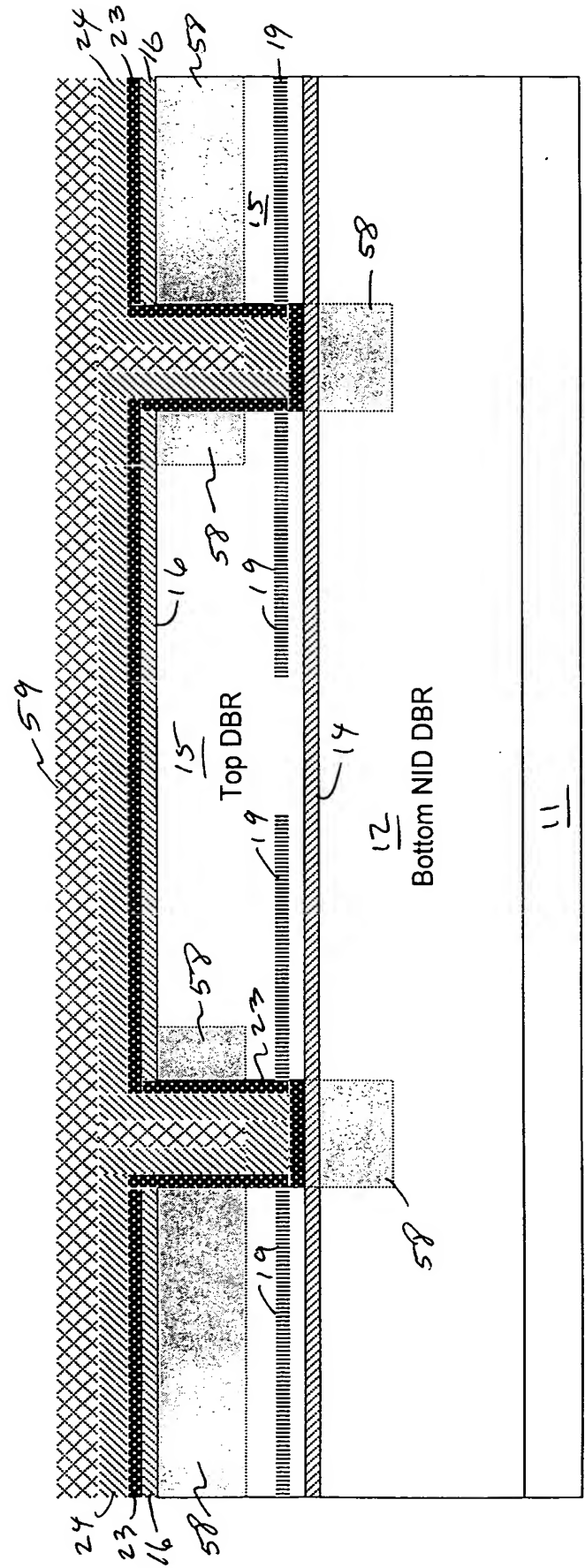


FIGURE 65

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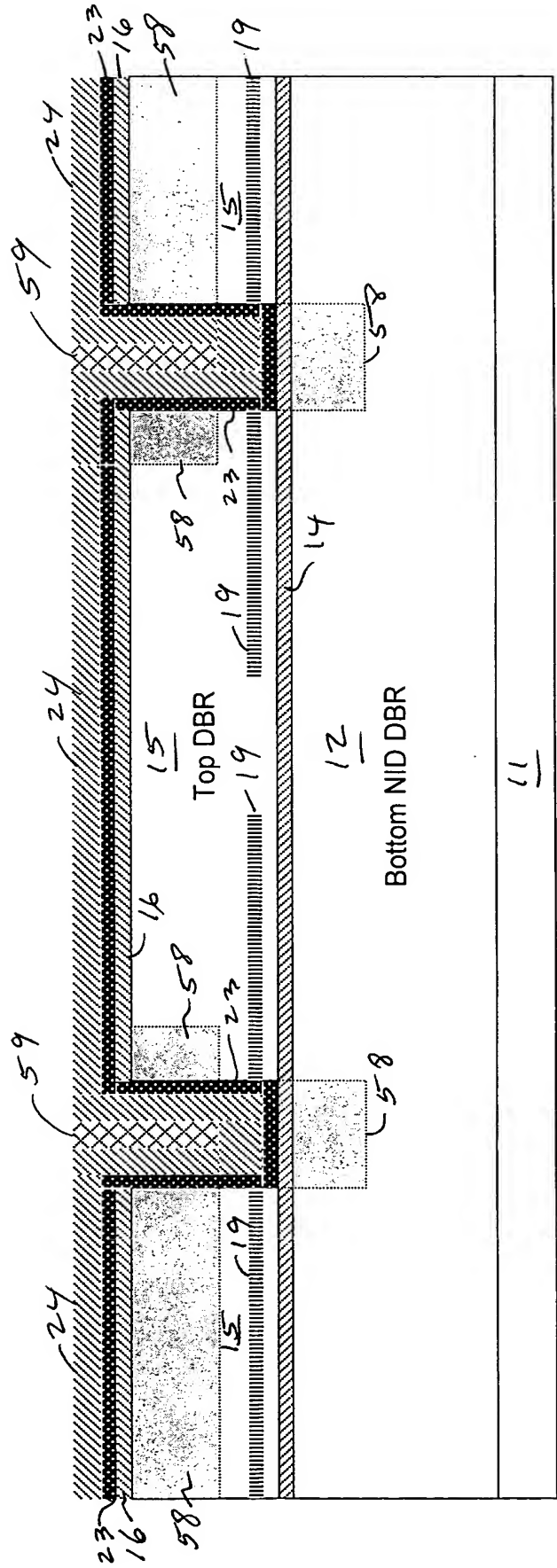


FIGURE 64

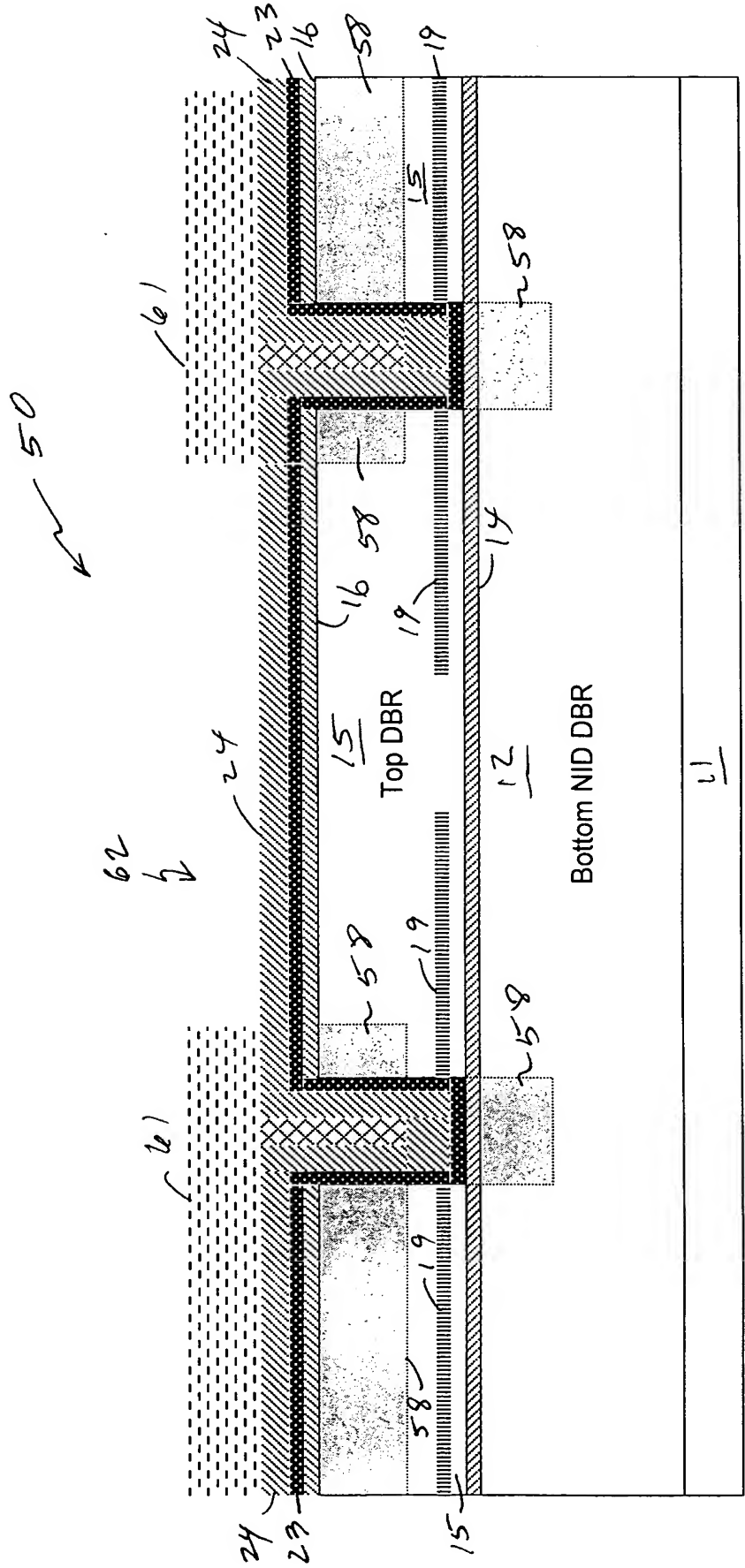
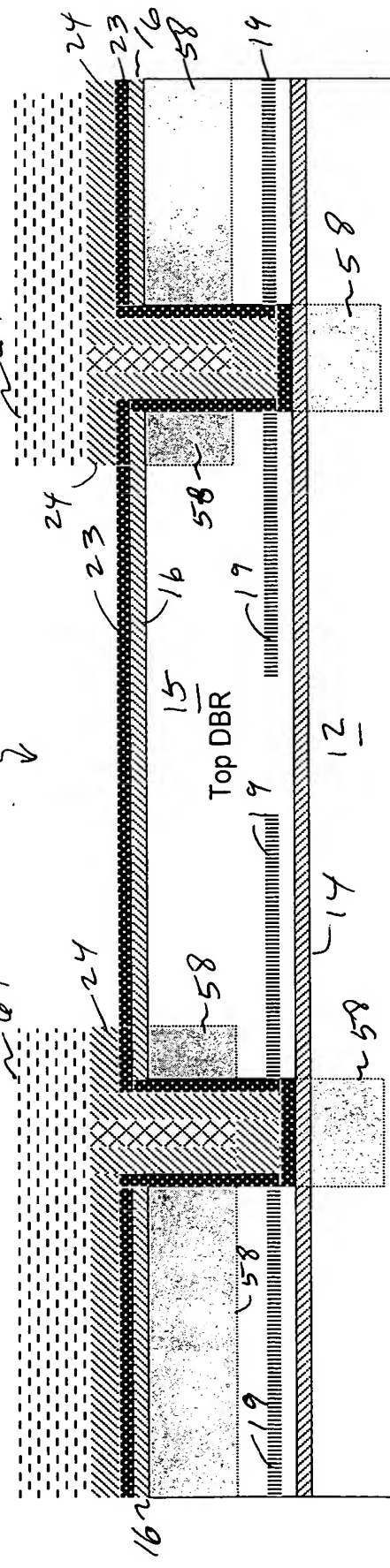


FIGURE 67

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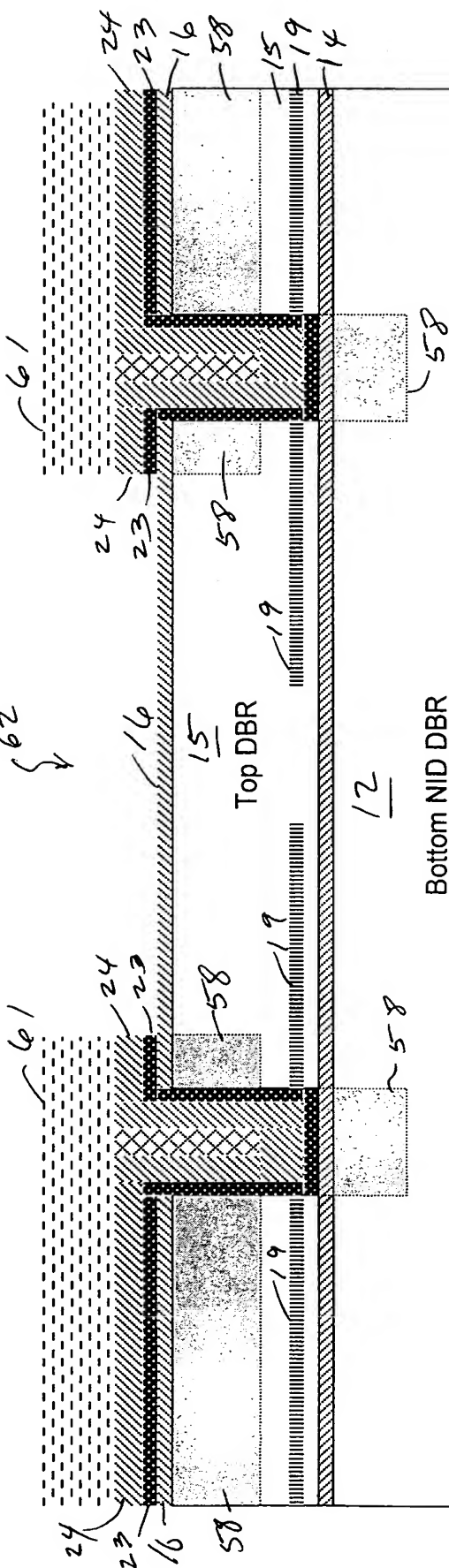
Bottom NID DBR

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FIGURE 68

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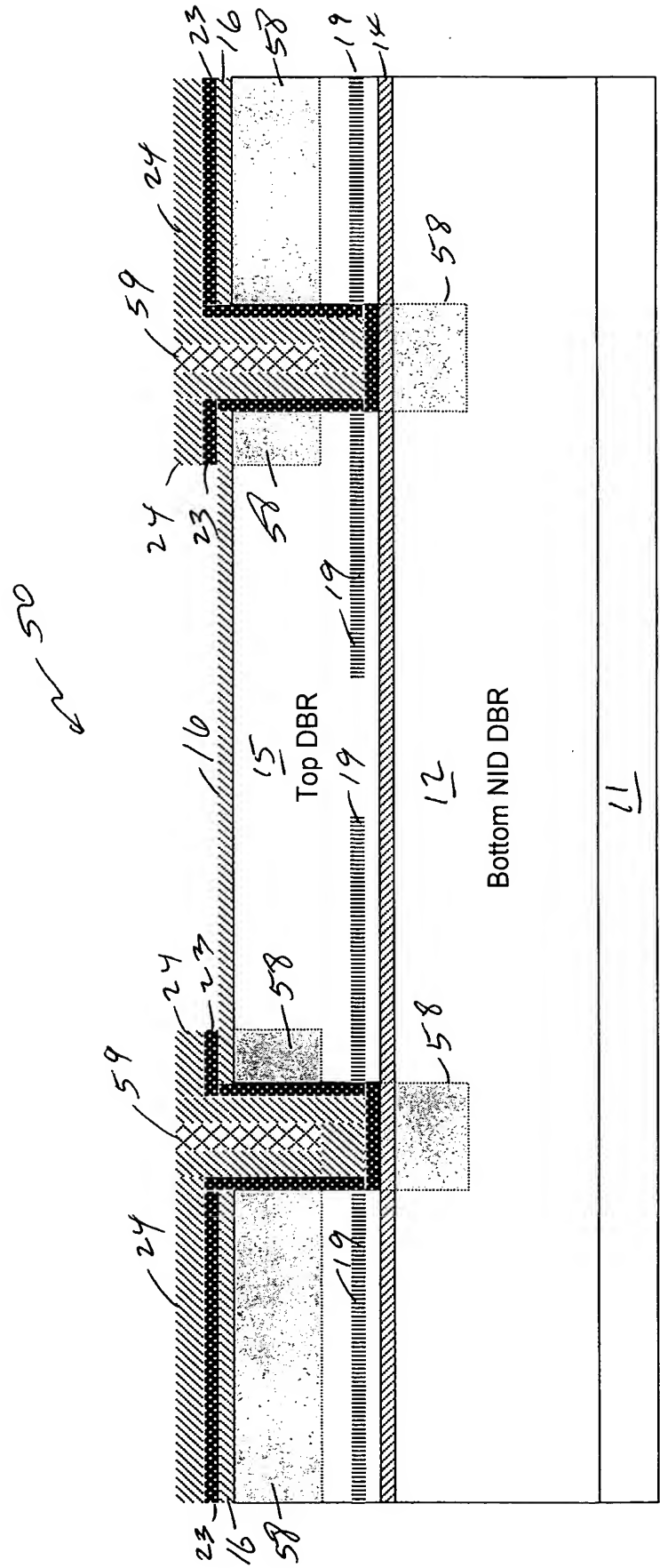


Top DBR

Bottom NID DBR

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FIGURE 69



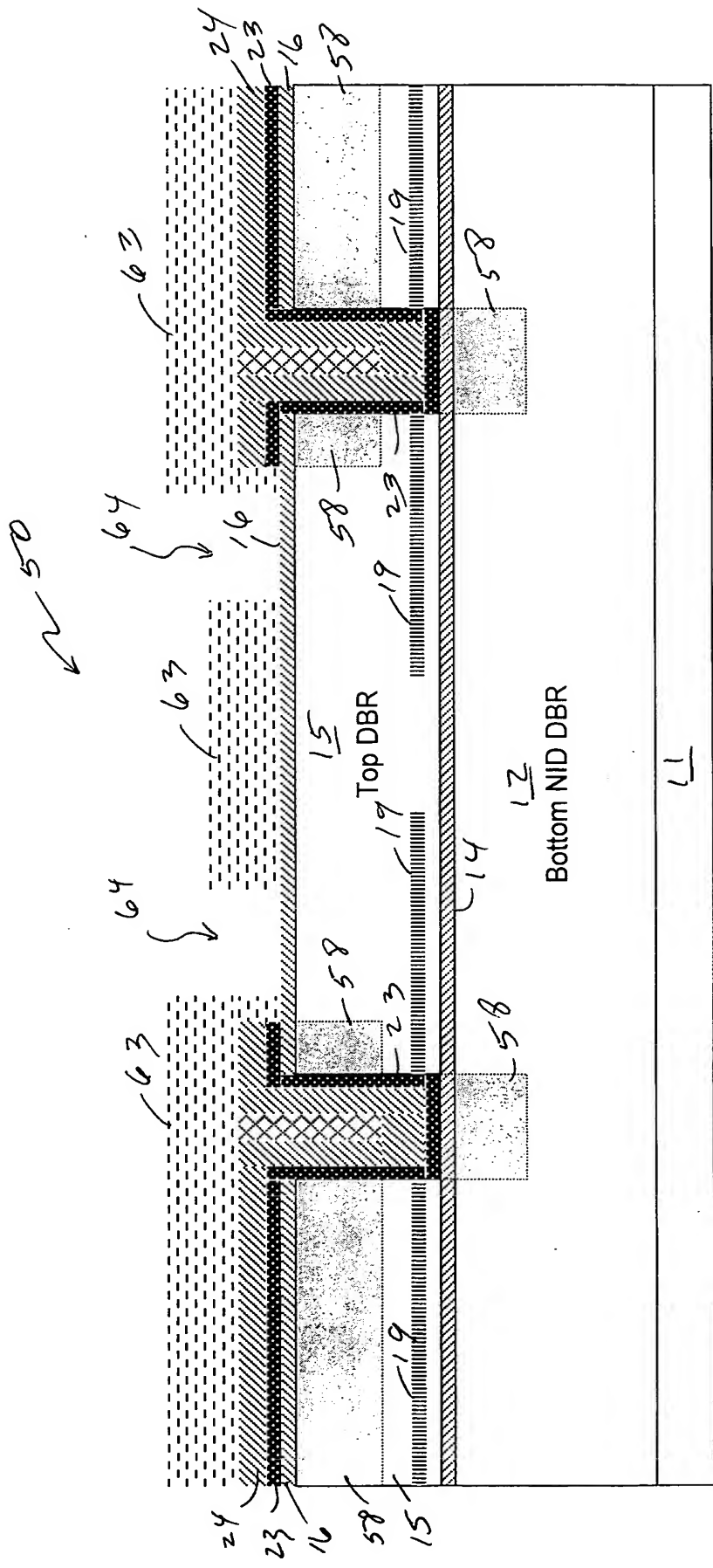


FIGURE 71

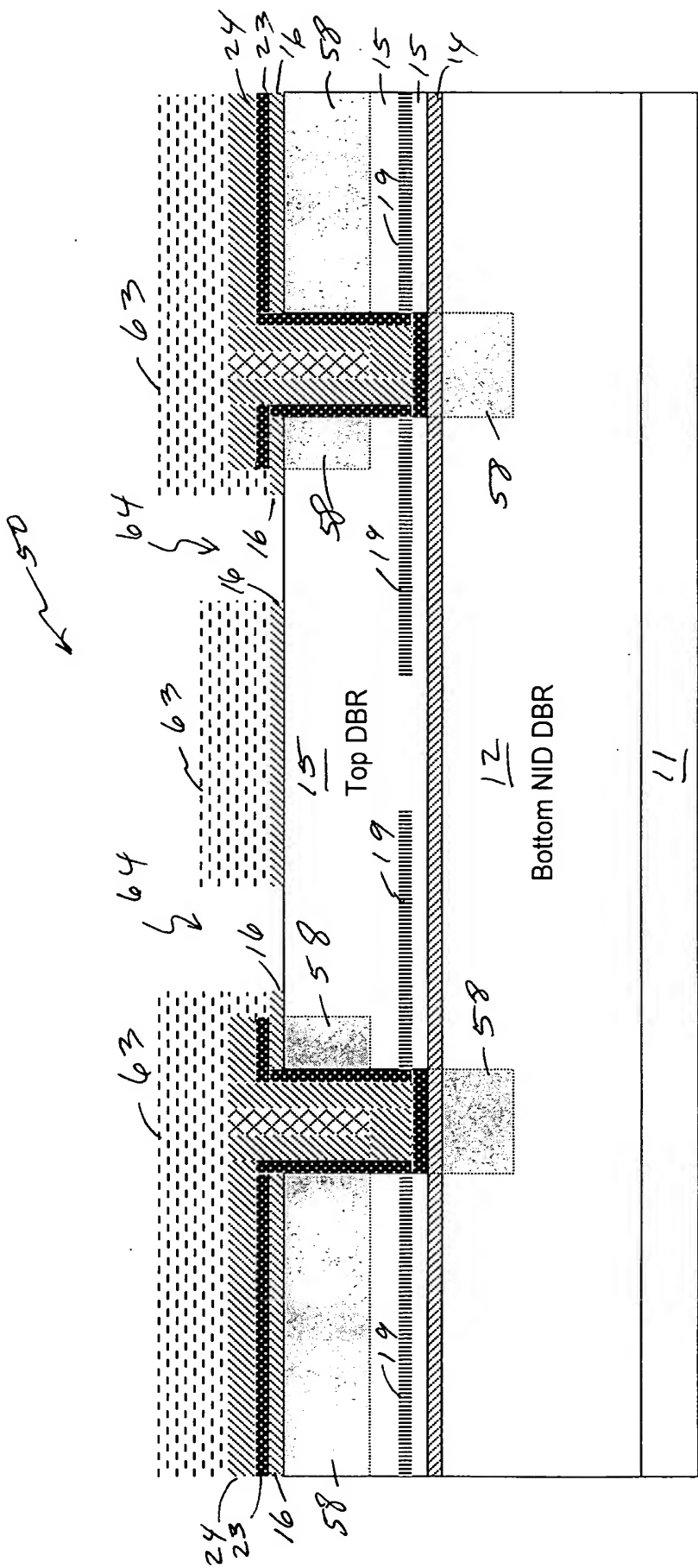


FIGURE 72

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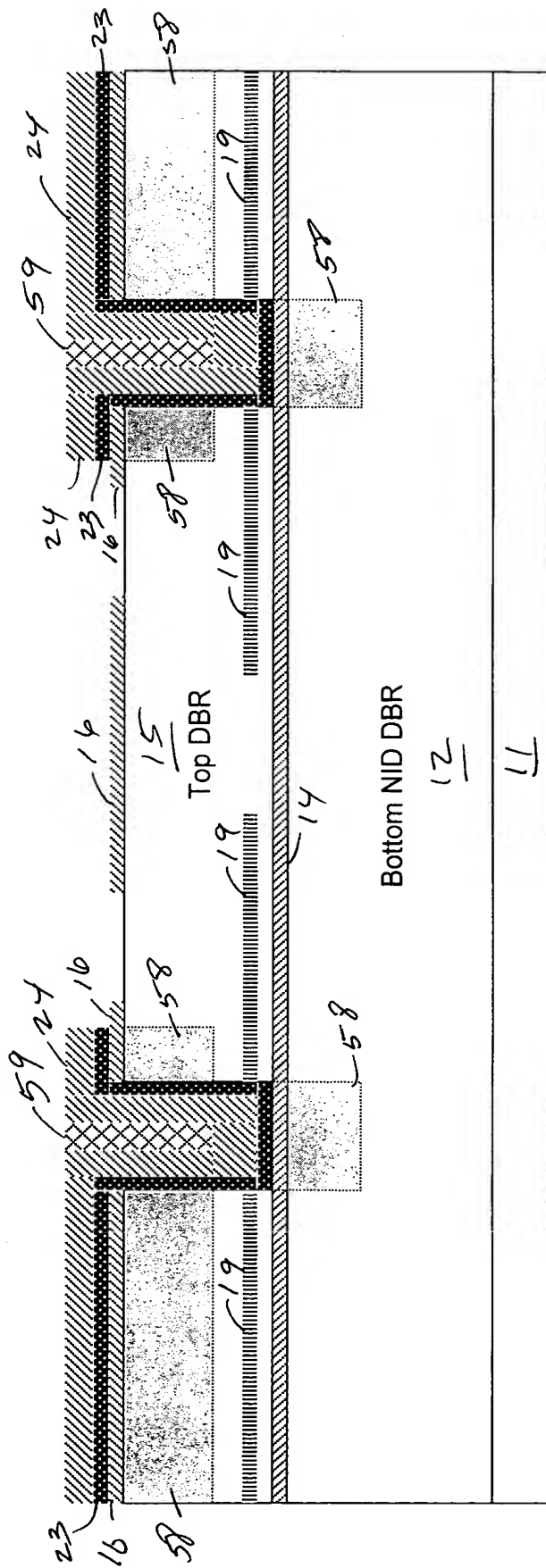


FIGURE 73

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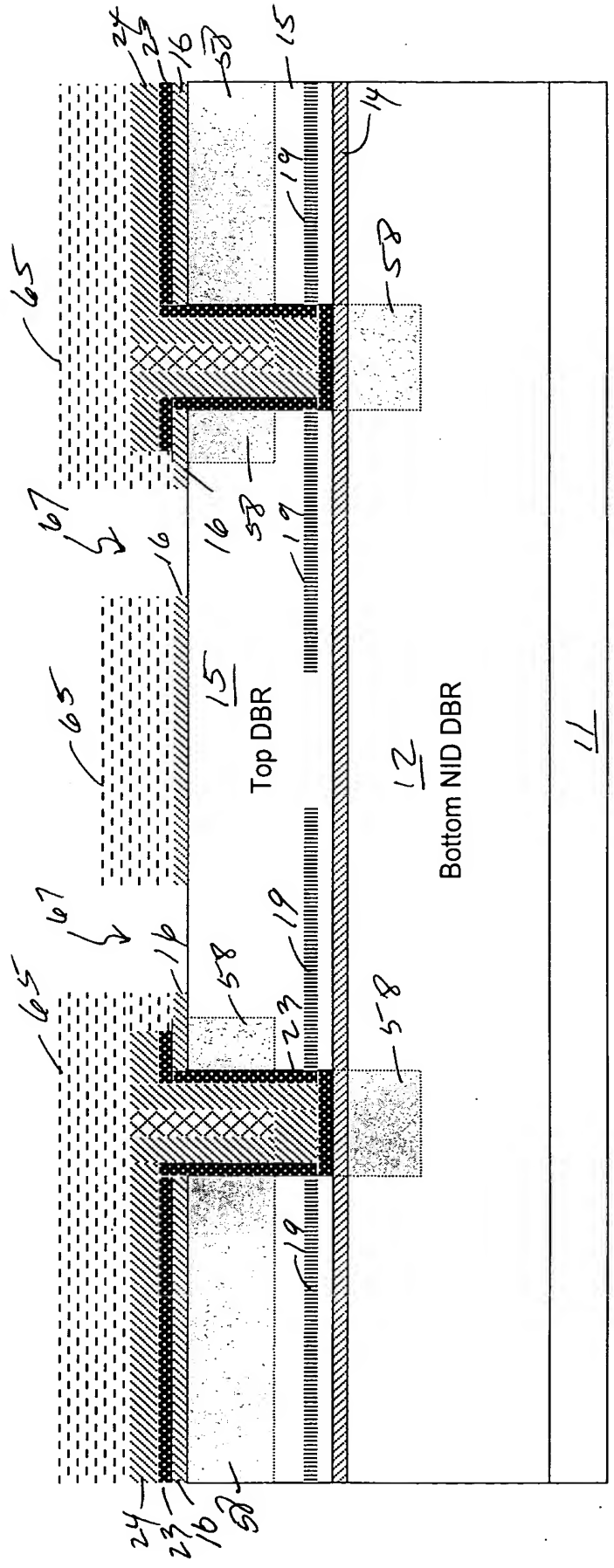


Figure 74

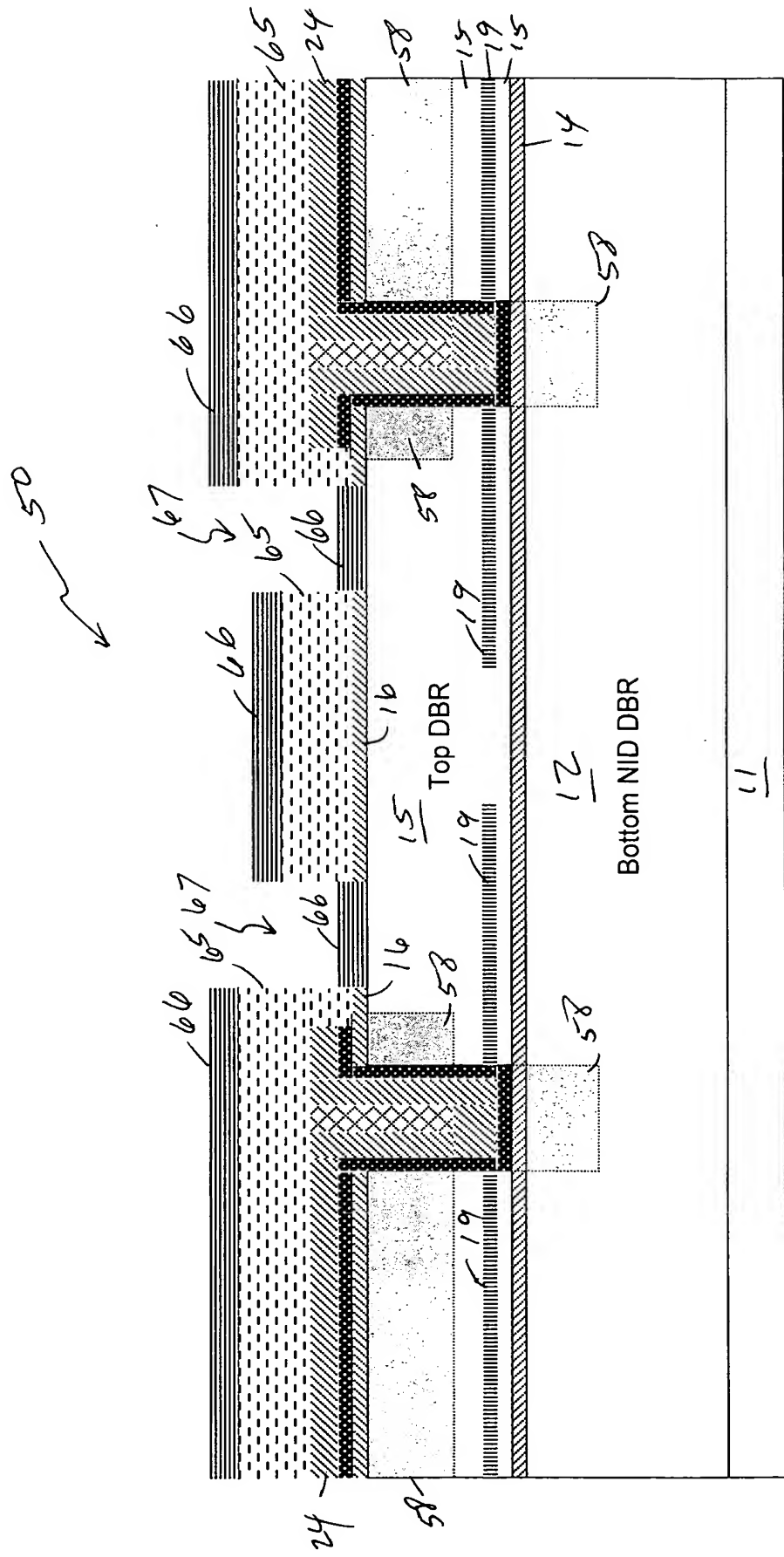


FIGURE 75

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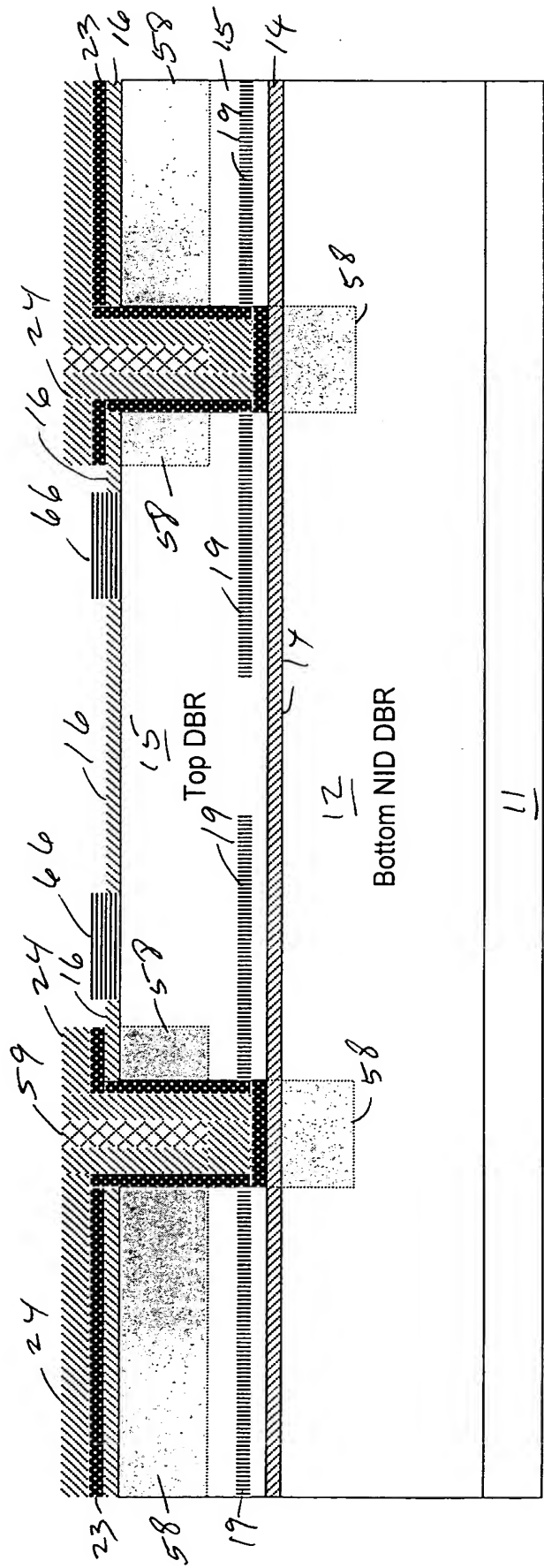


FIGURE 76

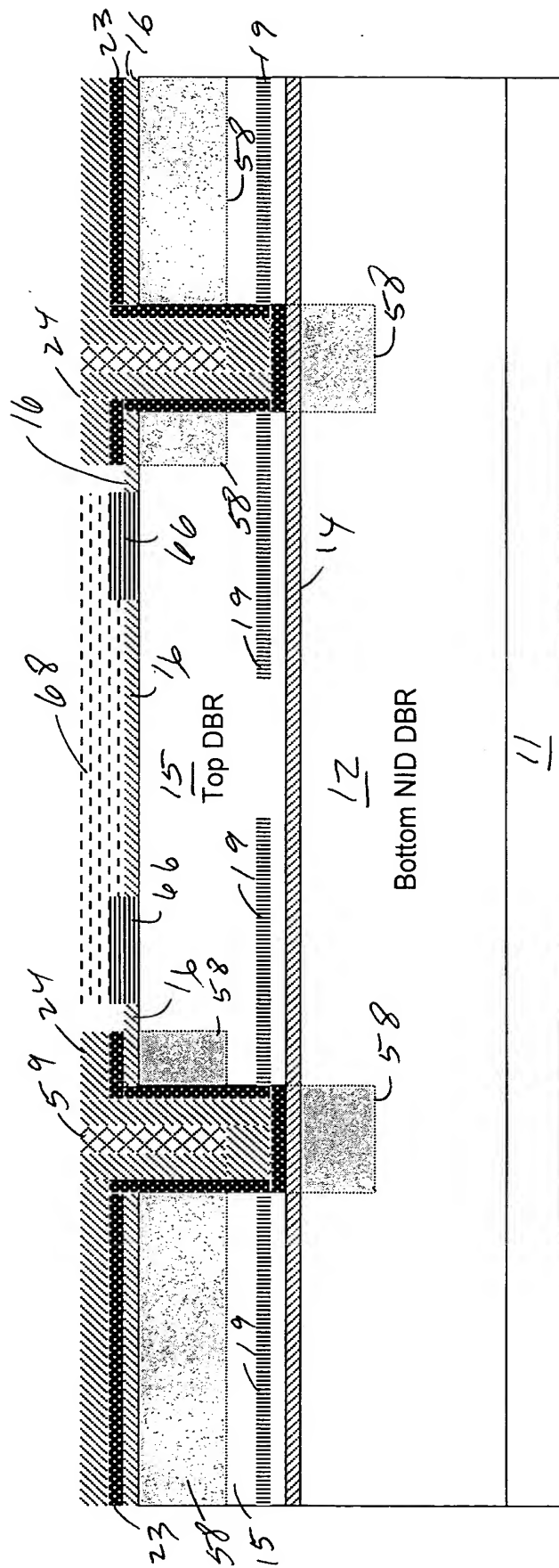


FIGURE 77

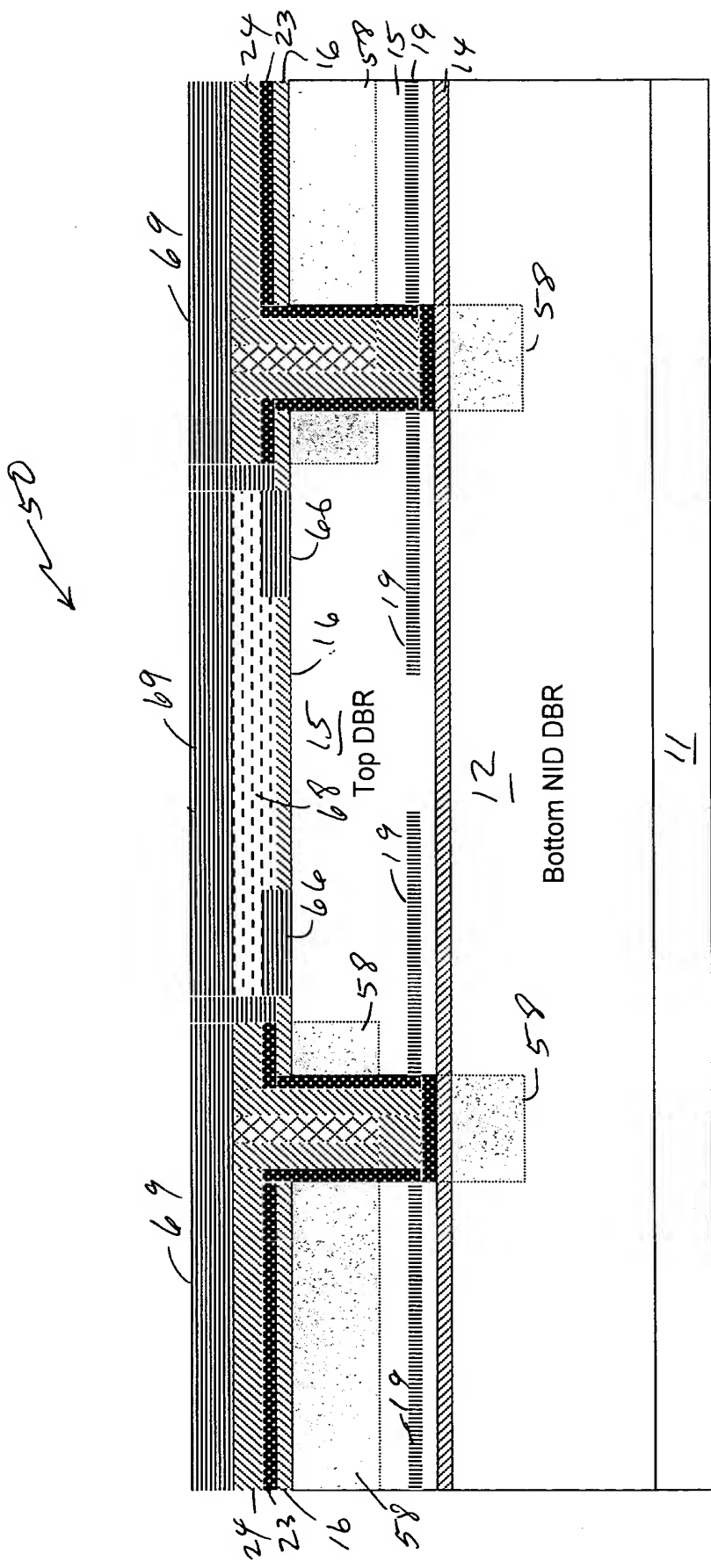


FIGURE 78

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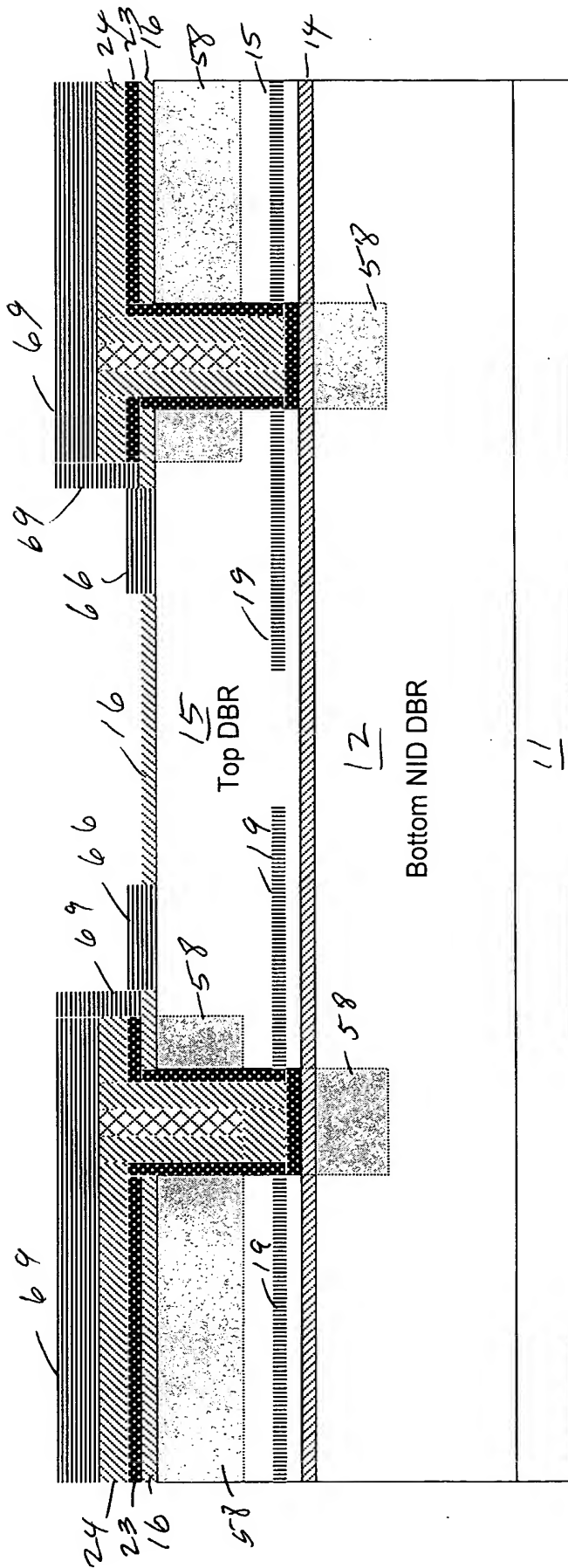


FIGURE 79

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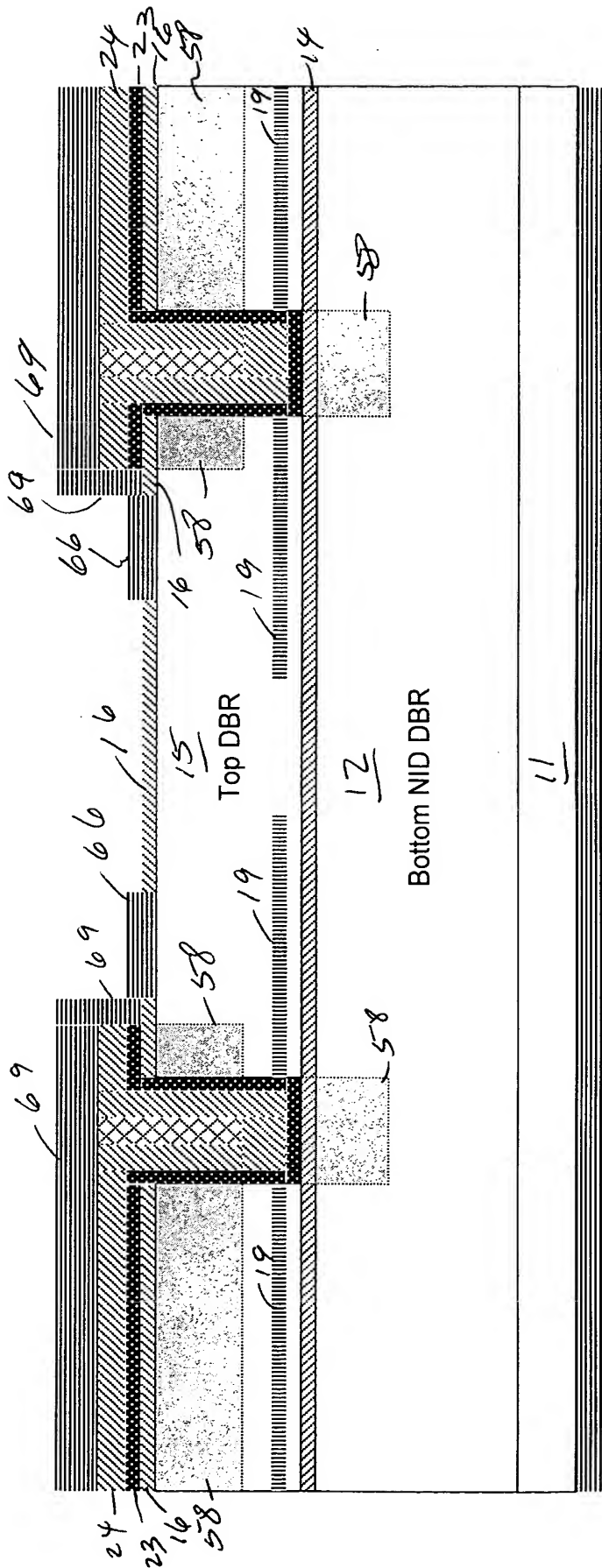


FIGURE 80

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16

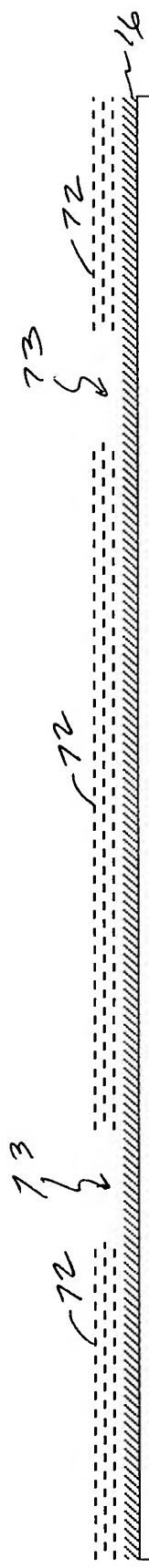
15
Top DBR

12
Bottom NID DBR

11

FIGURE 81

~60



15
Top DBR

12
Bottom NID DBR

11

FIGURE 82

60 ↗

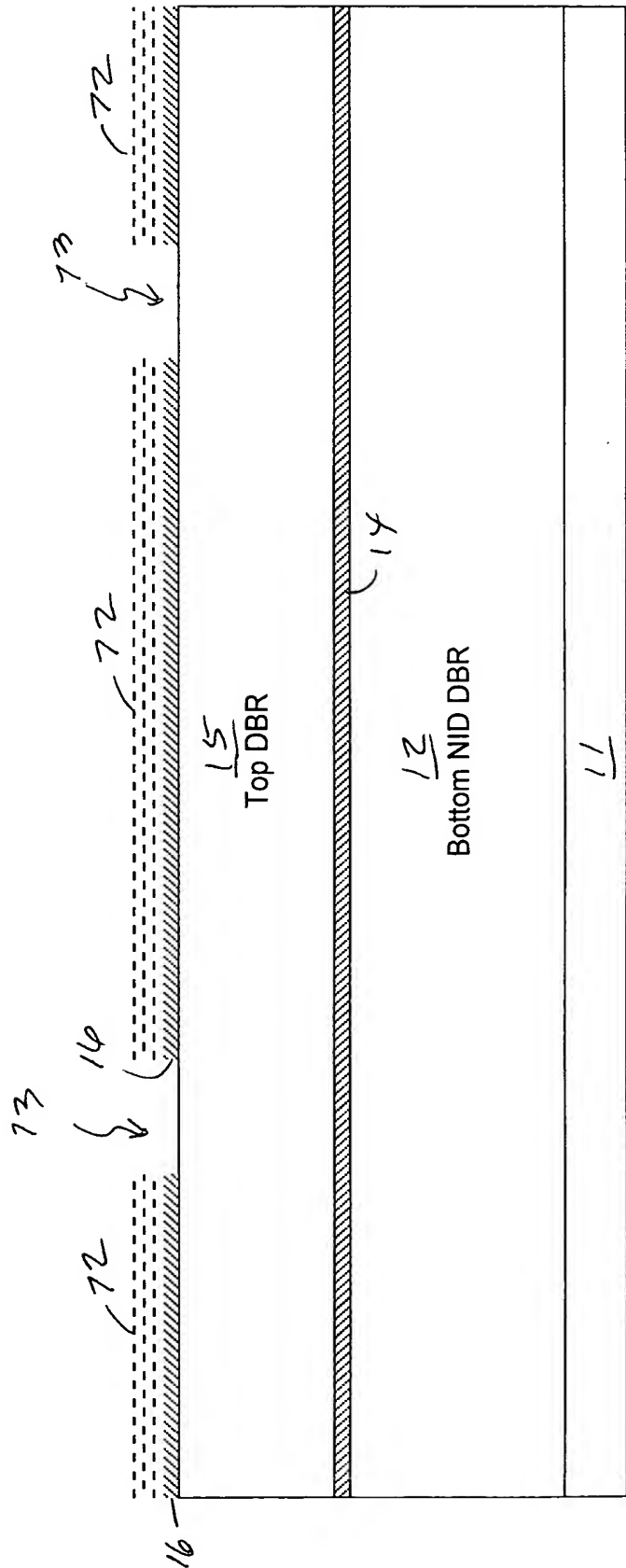


FIGURE 83

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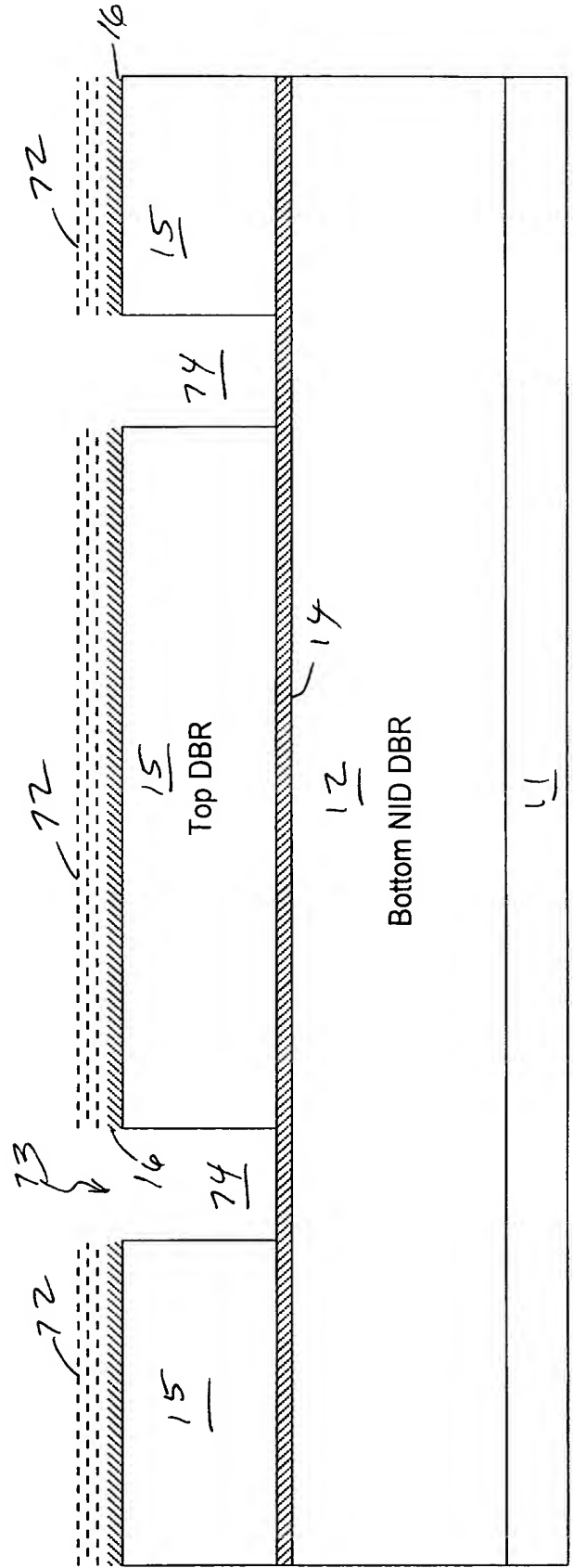


FIGURE 84

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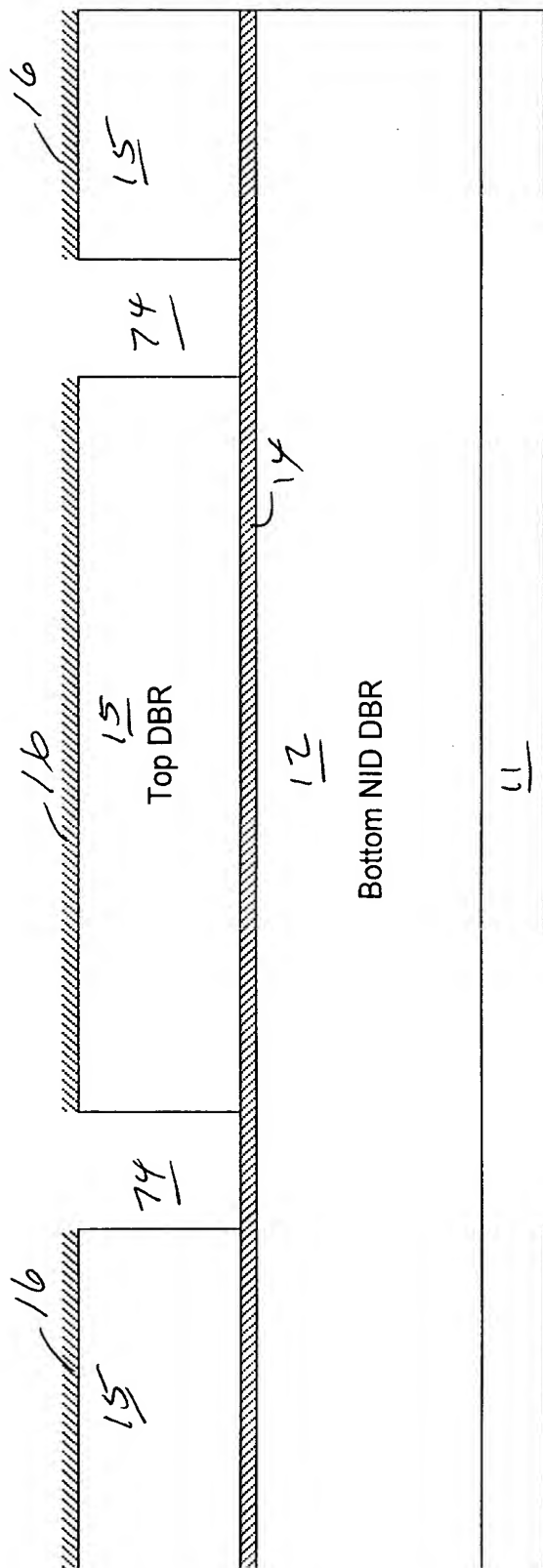


FIGURE 85

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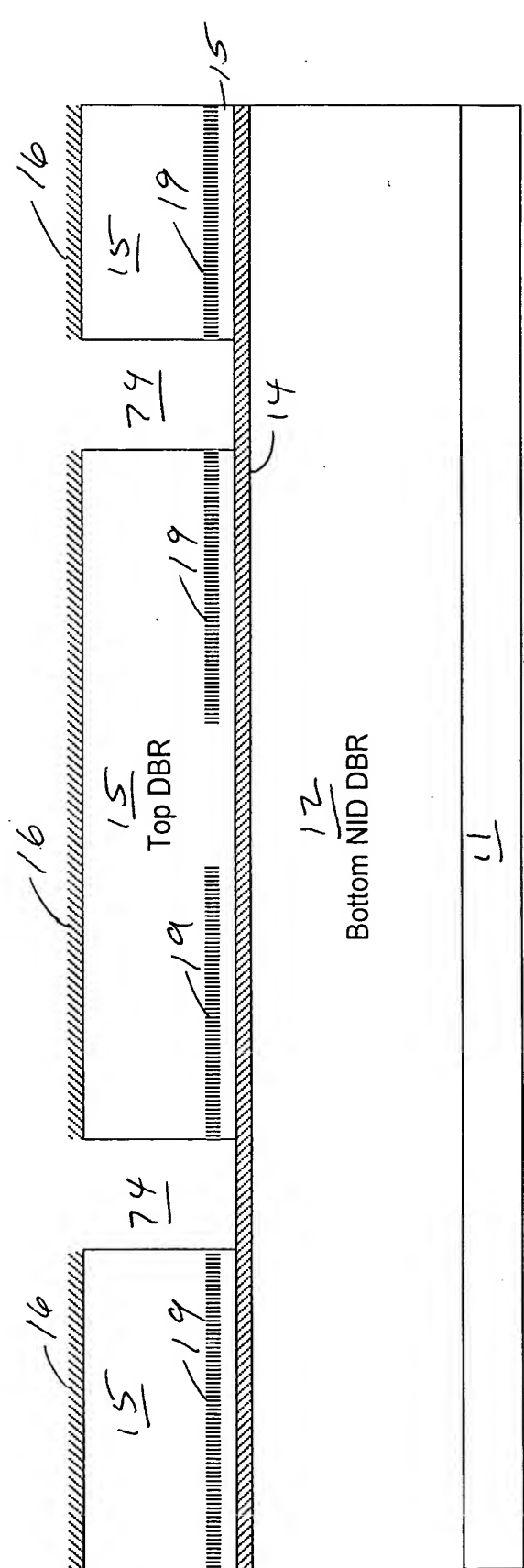


FIGURE 86

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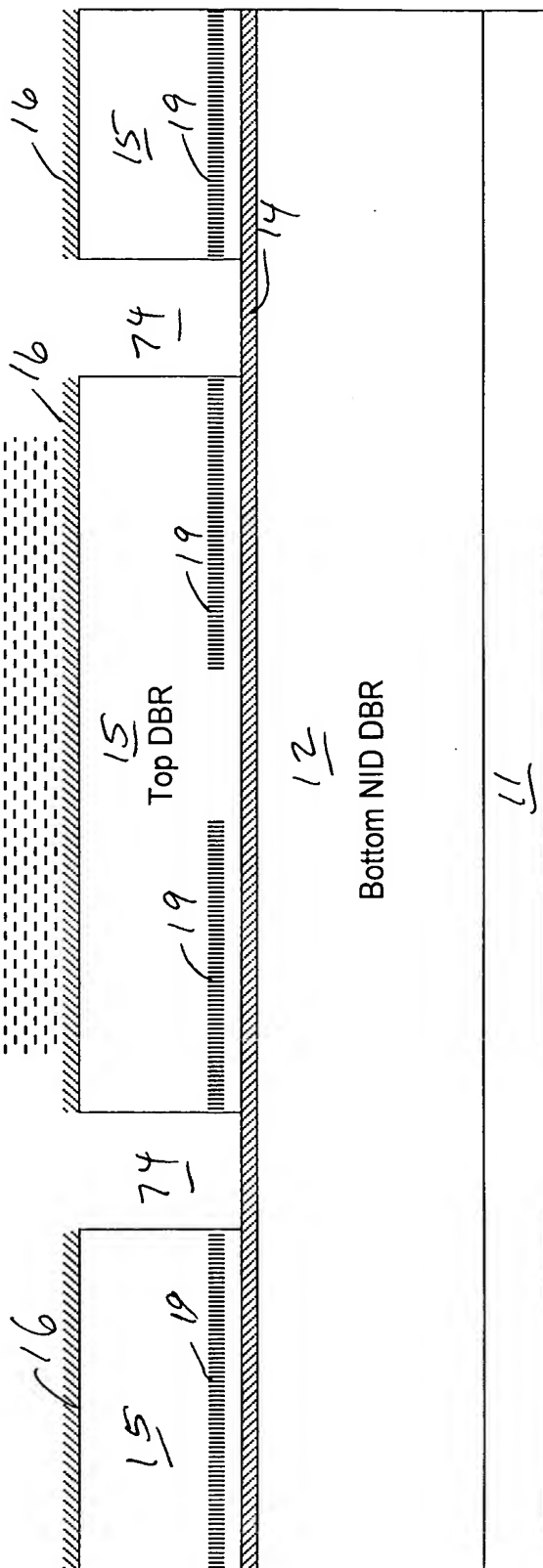
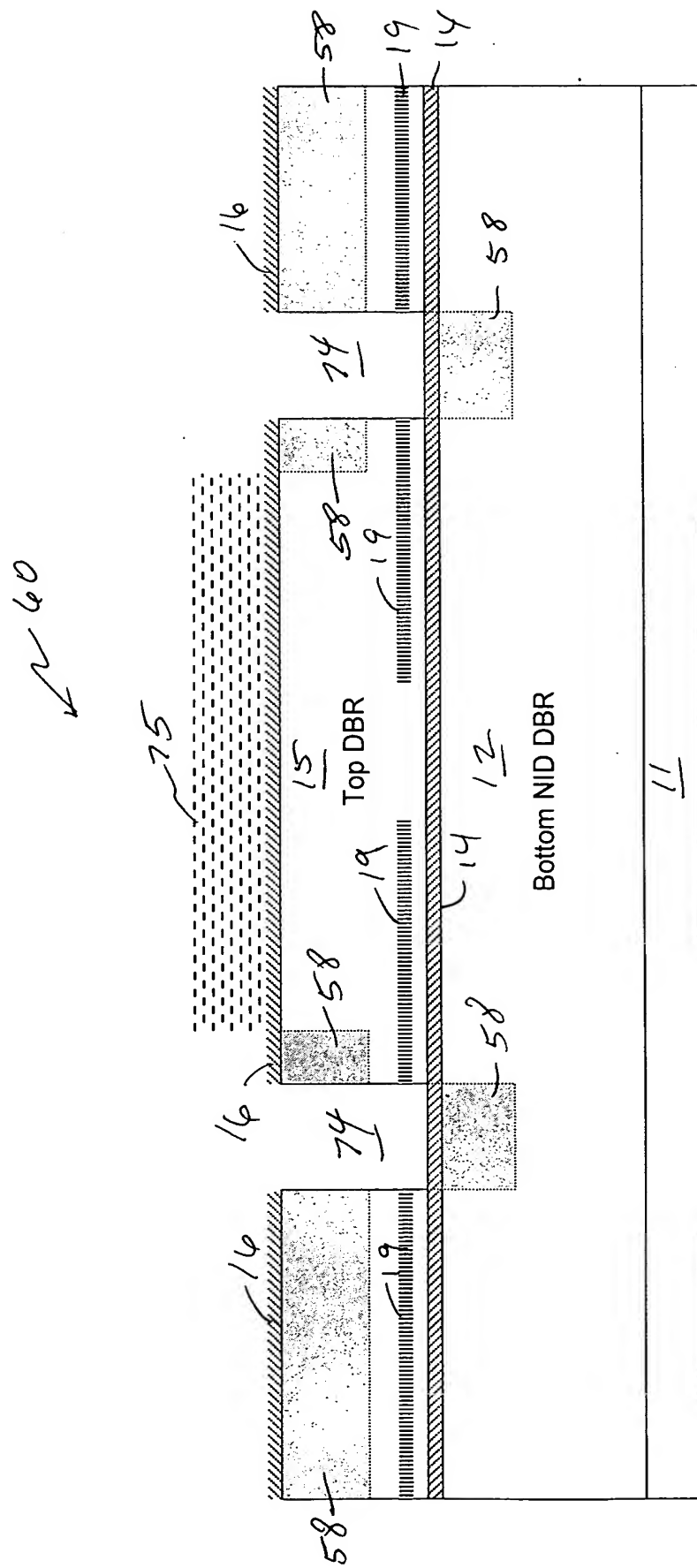


FIGURE 87



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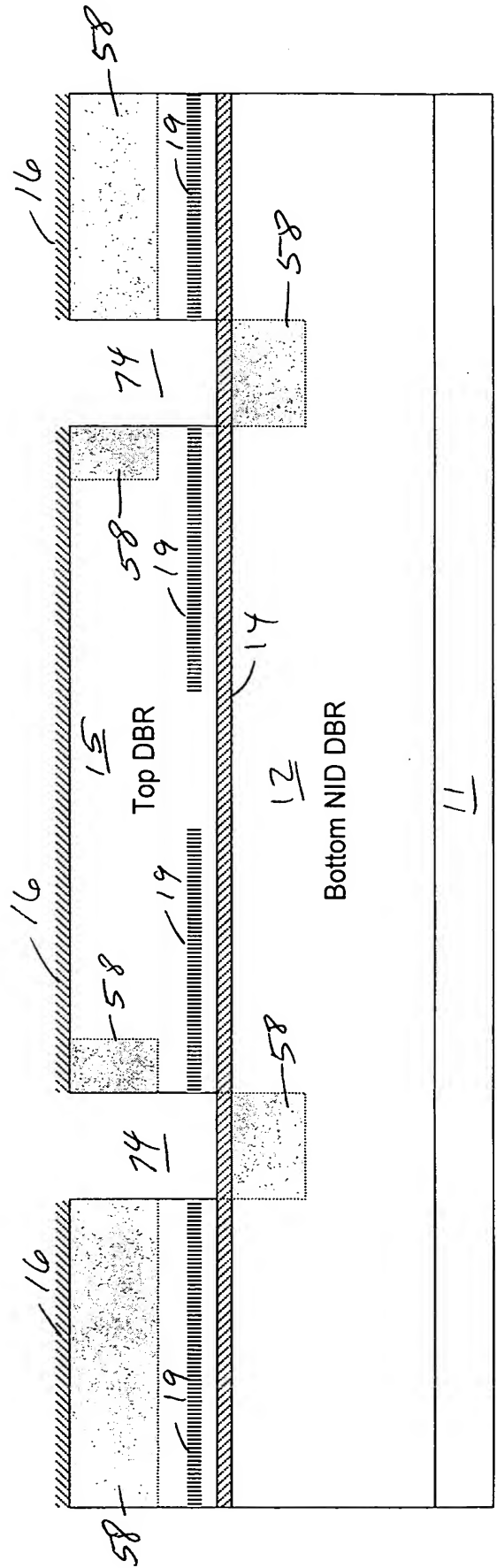


FIGURE 89

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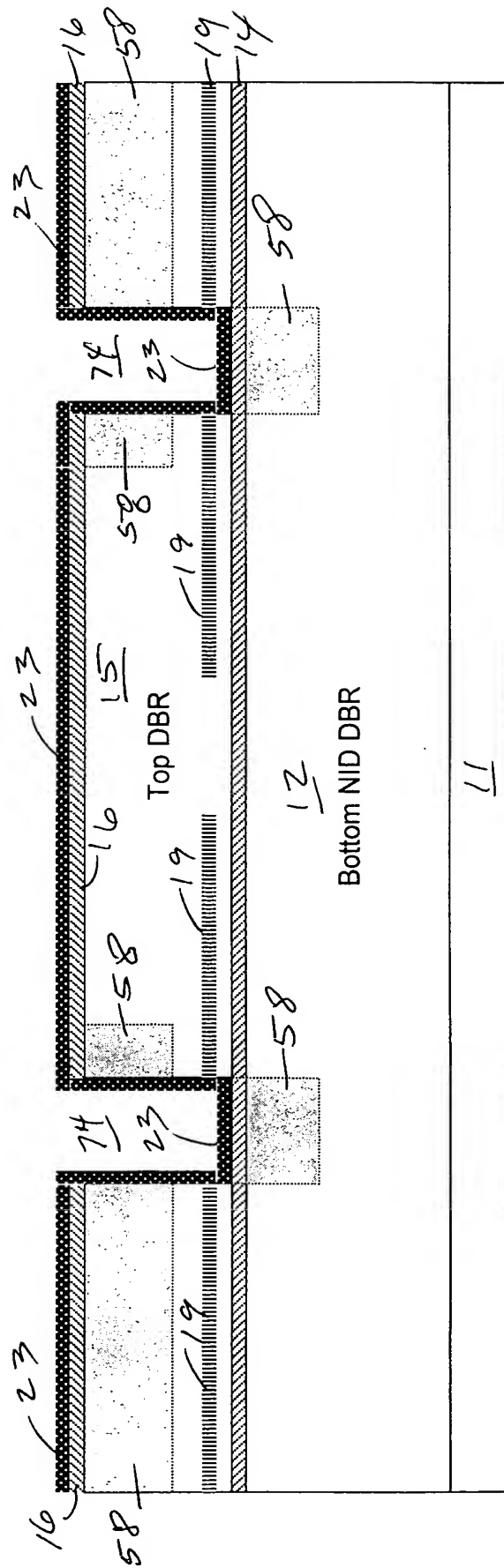


FIGURE 90

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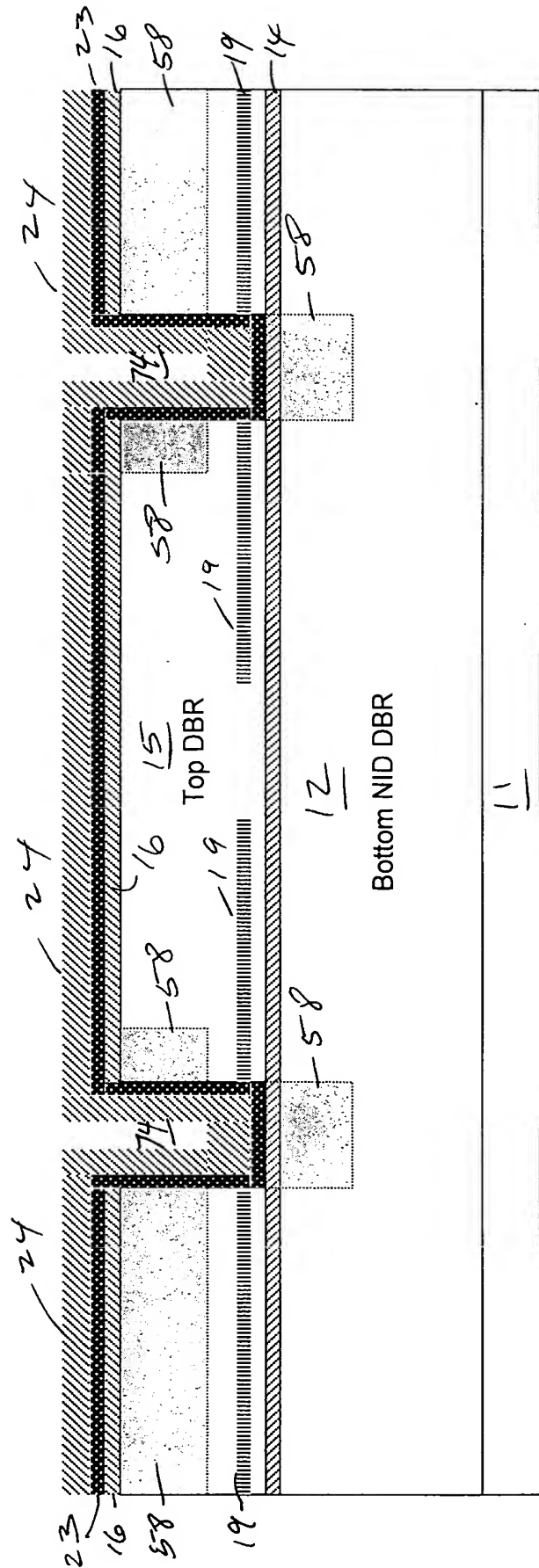


FIGURE 91

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76

76

24
23
16
58

24
16
15
58
19
Top DBR

24
23
16
58
19
14

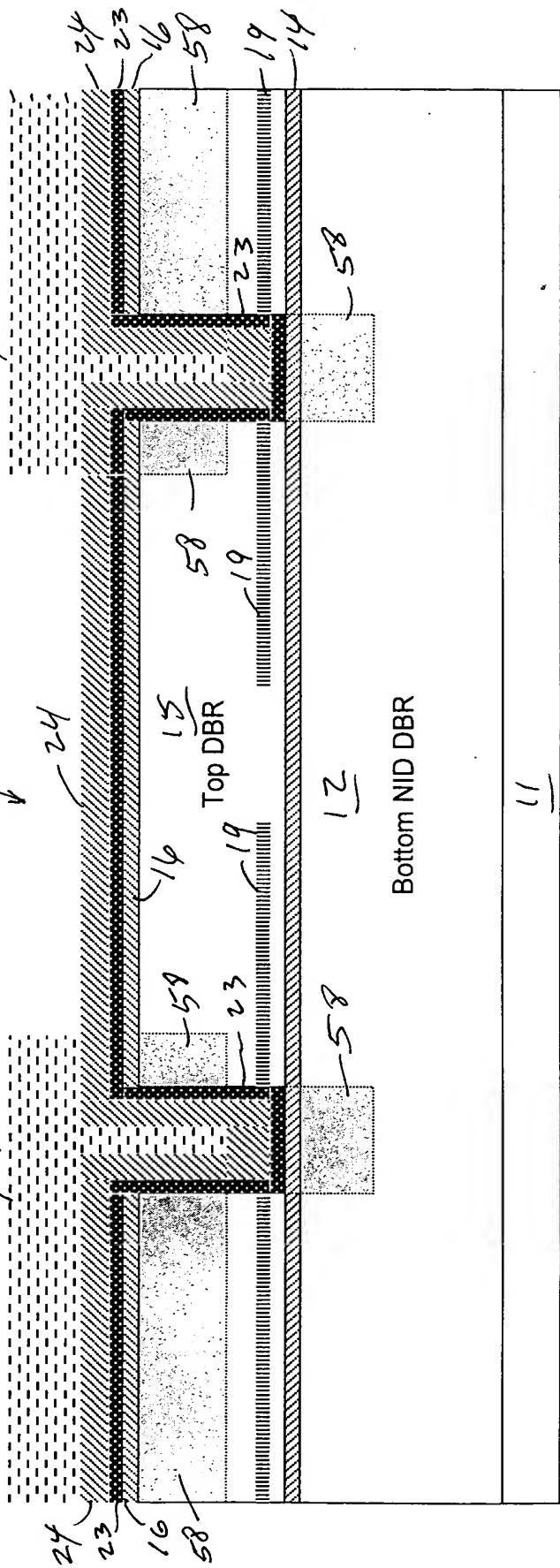
58
23
58

12

Bottom NID DBR

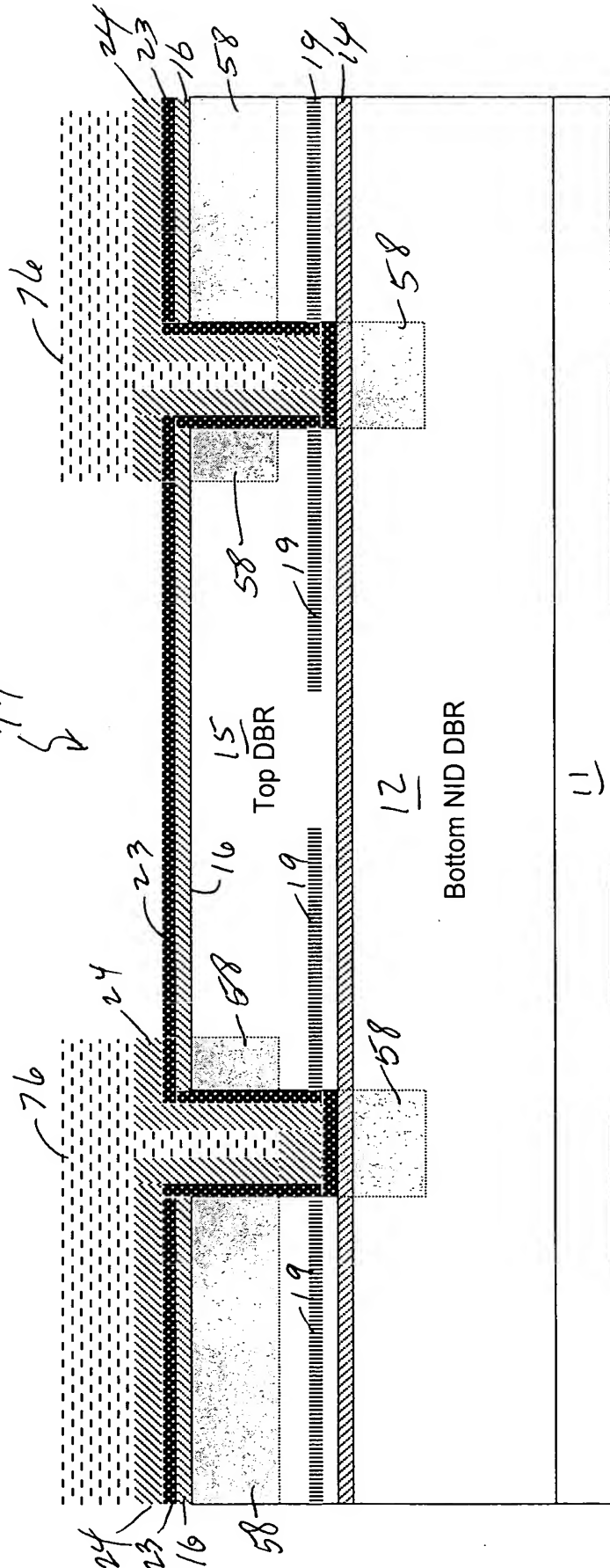
11

FIGURE 92



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FIGURE 93

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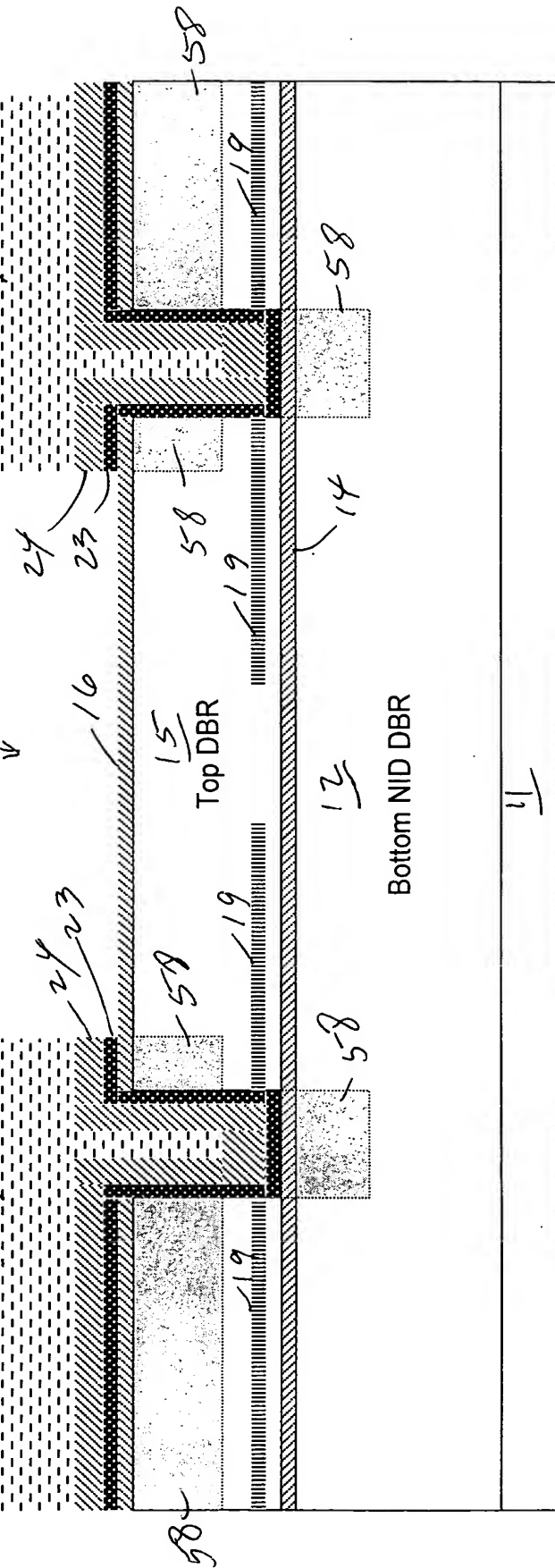
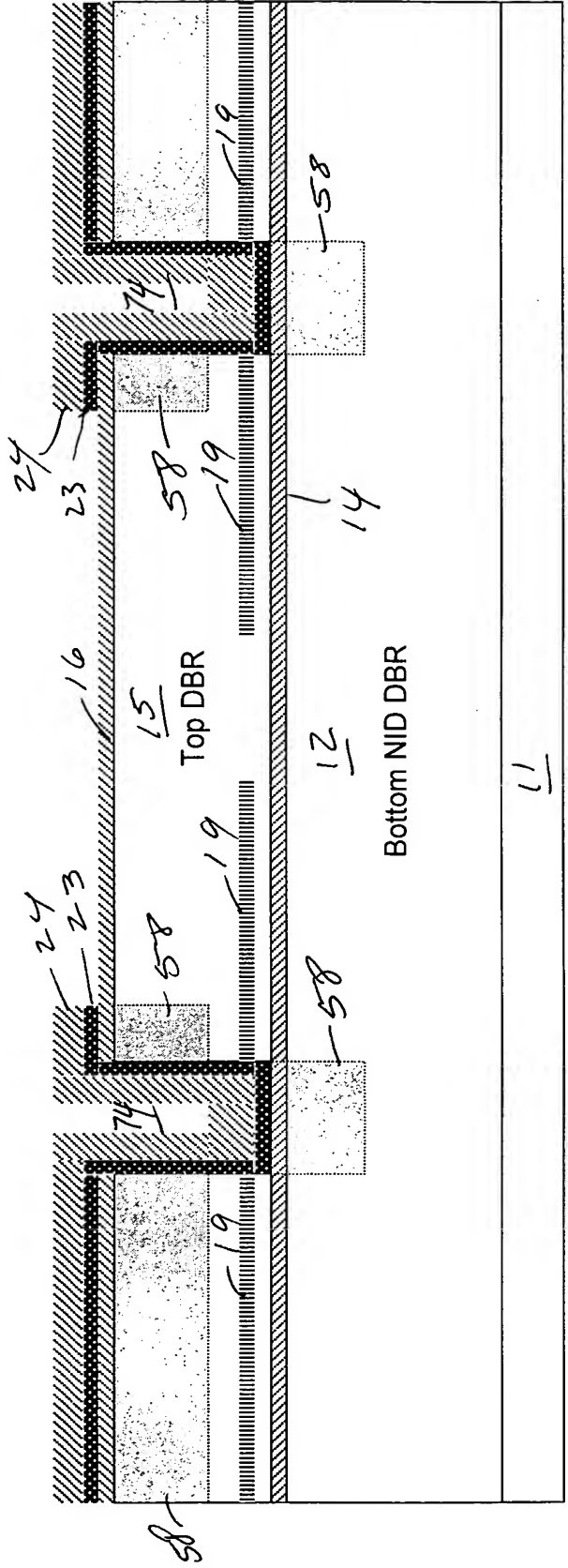


FIGURE 94

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11
FIGURE 95

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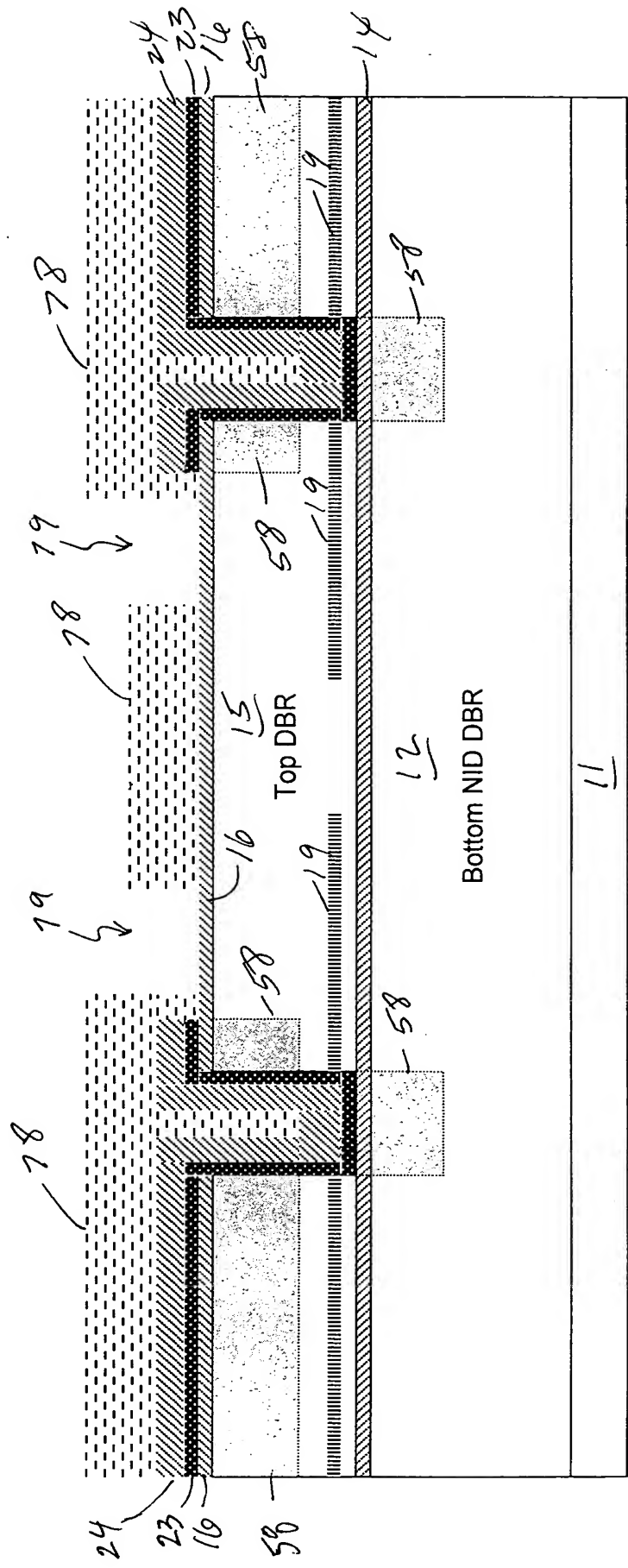


FIGURE 9C

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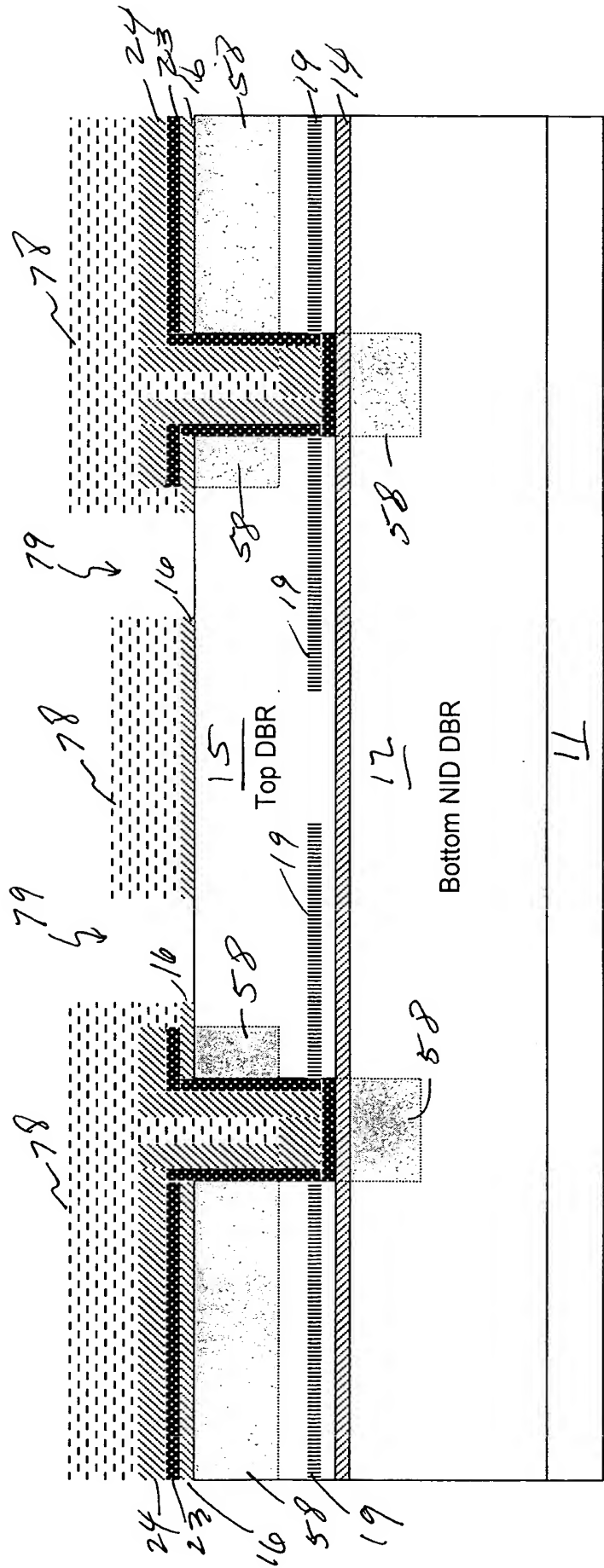


FIGURE 97

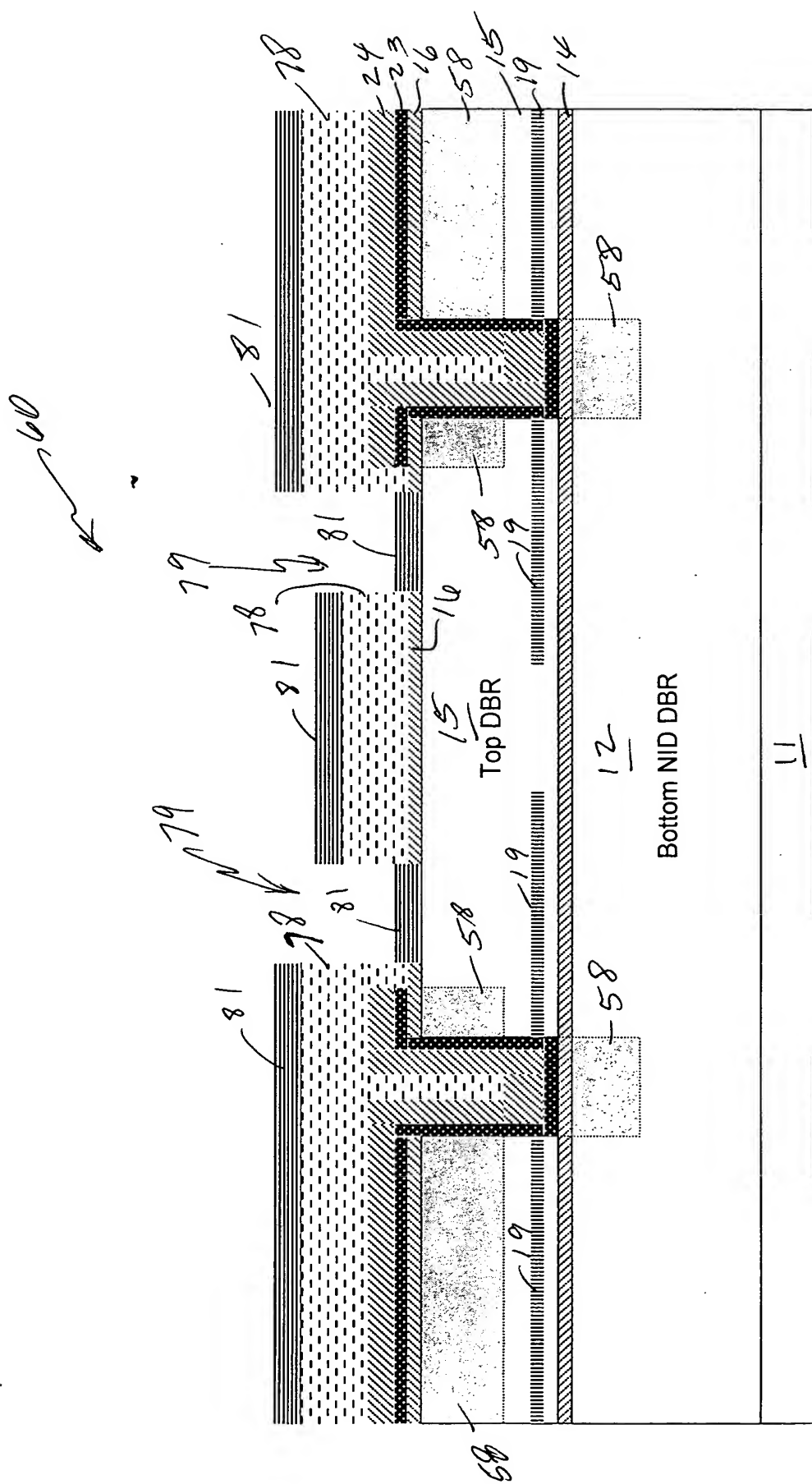


FIGURE 98

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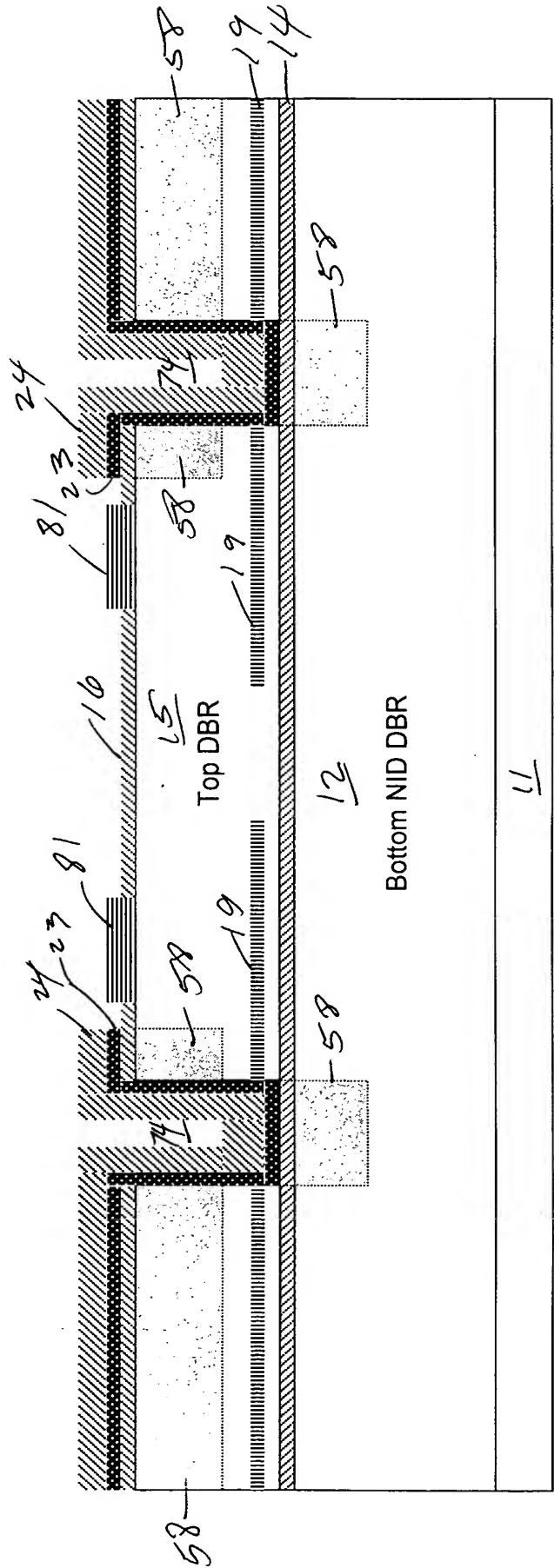


FIGURE 99

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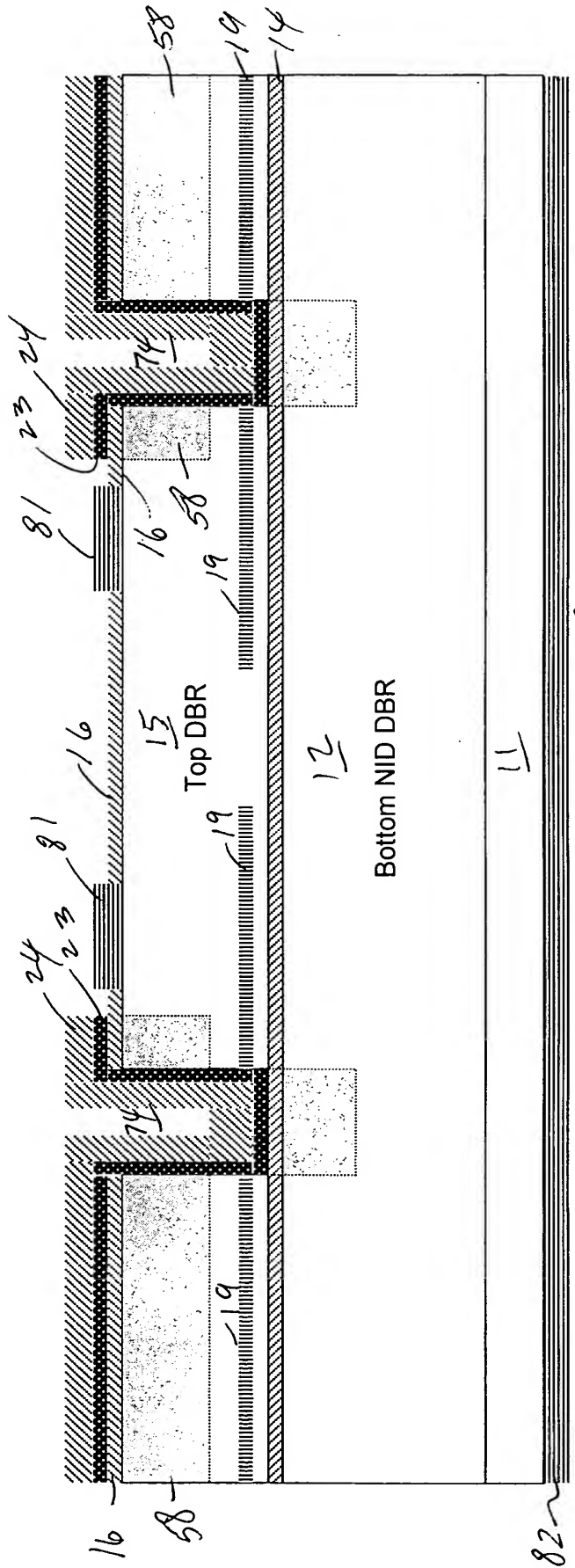


FIGURE 100

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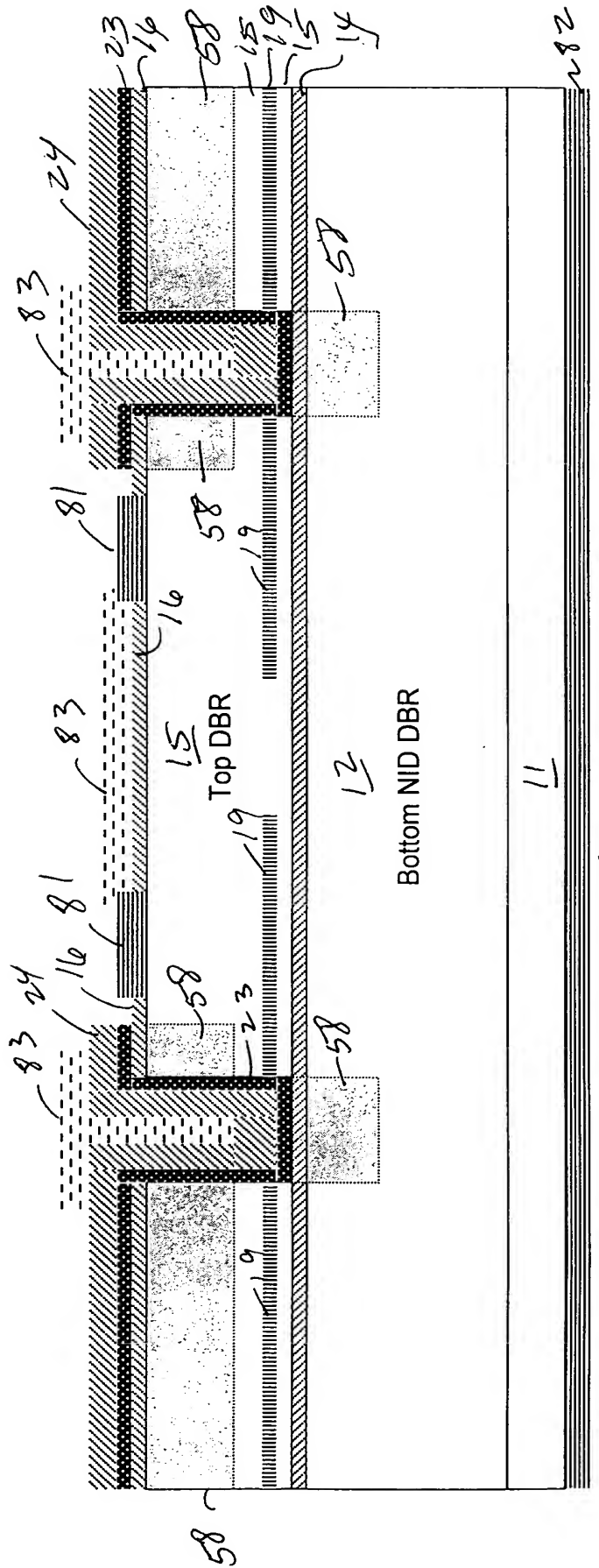


FIGURE 101

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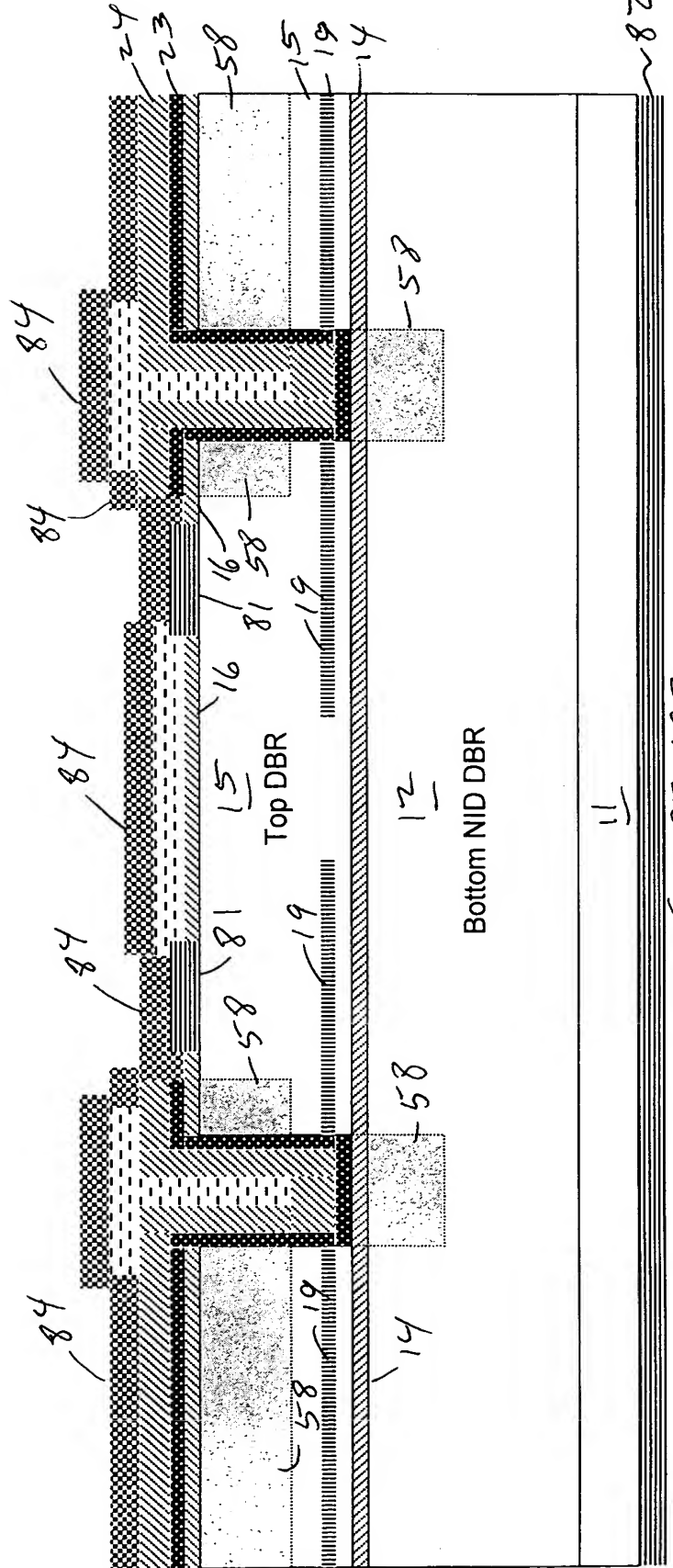


FIGURE 102

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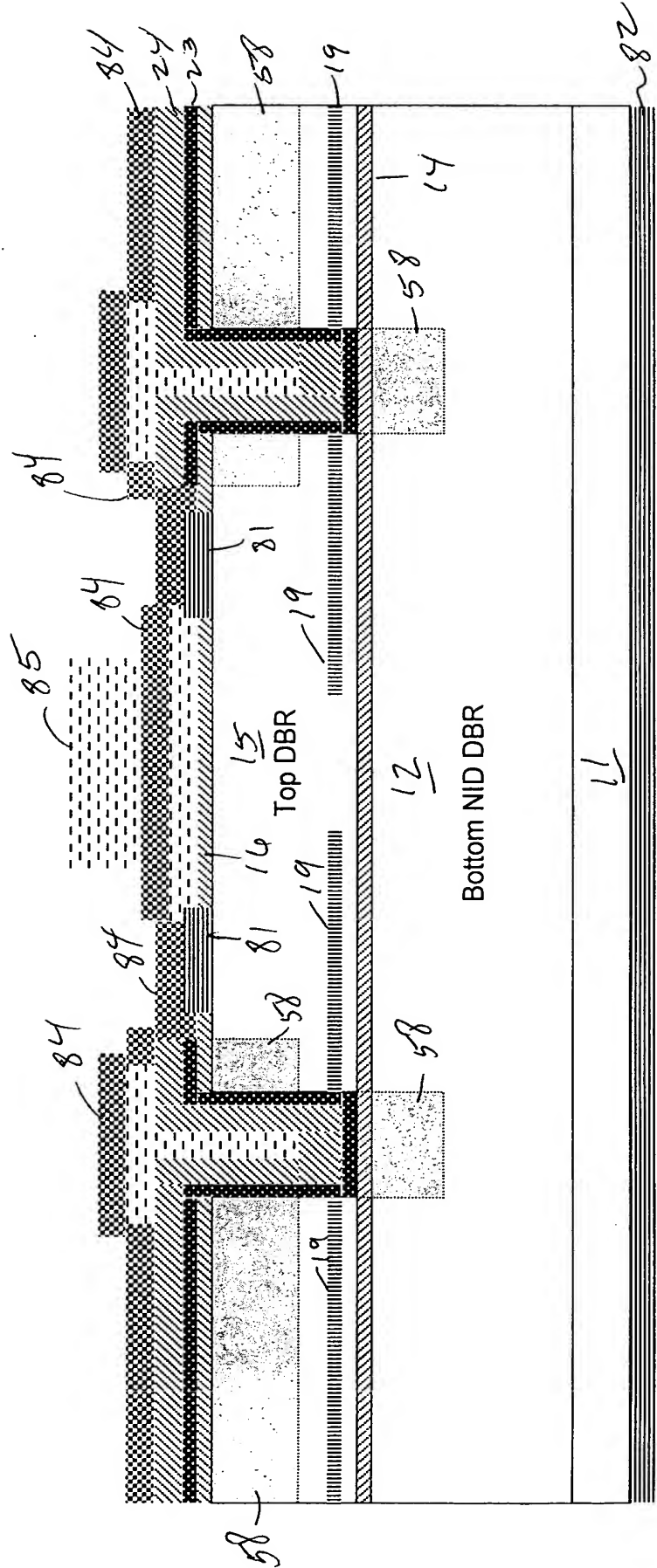


FIGURE 103

60 ↗

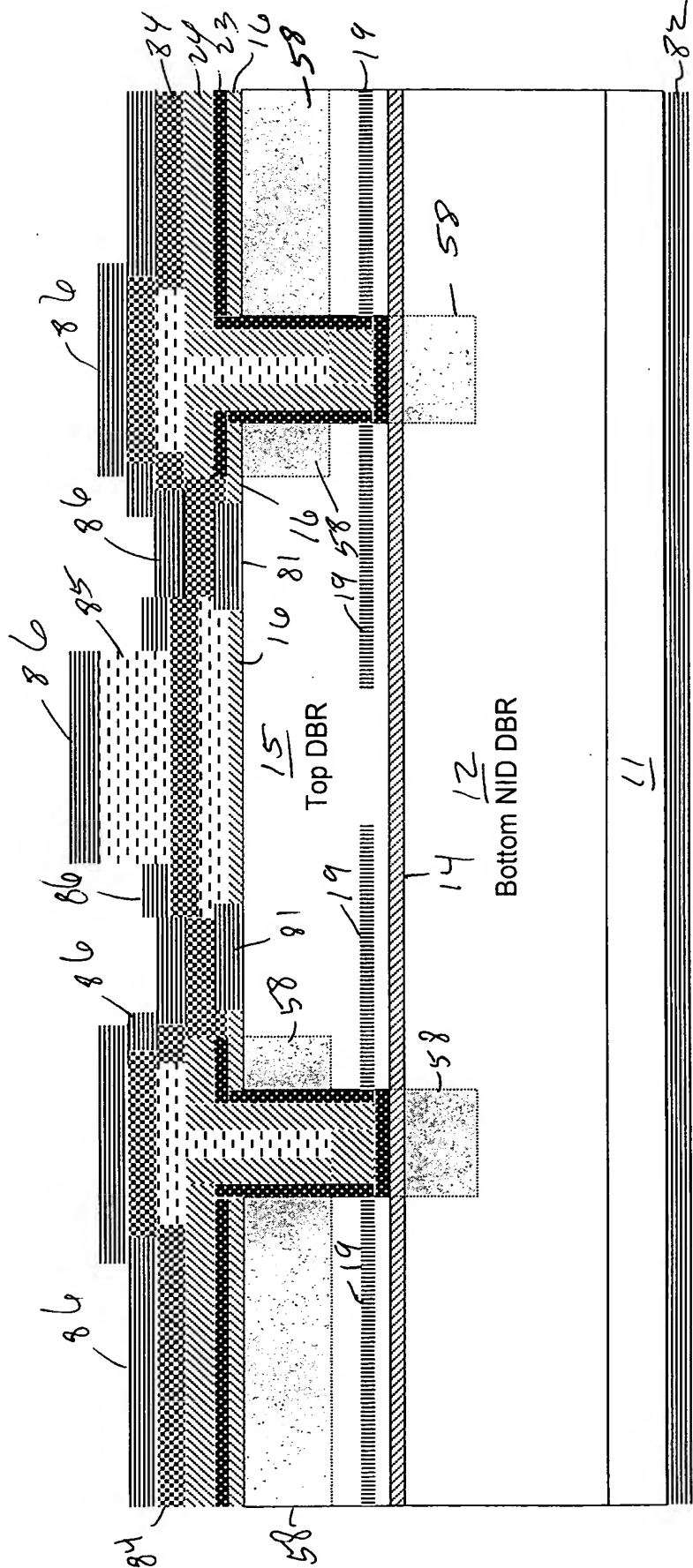
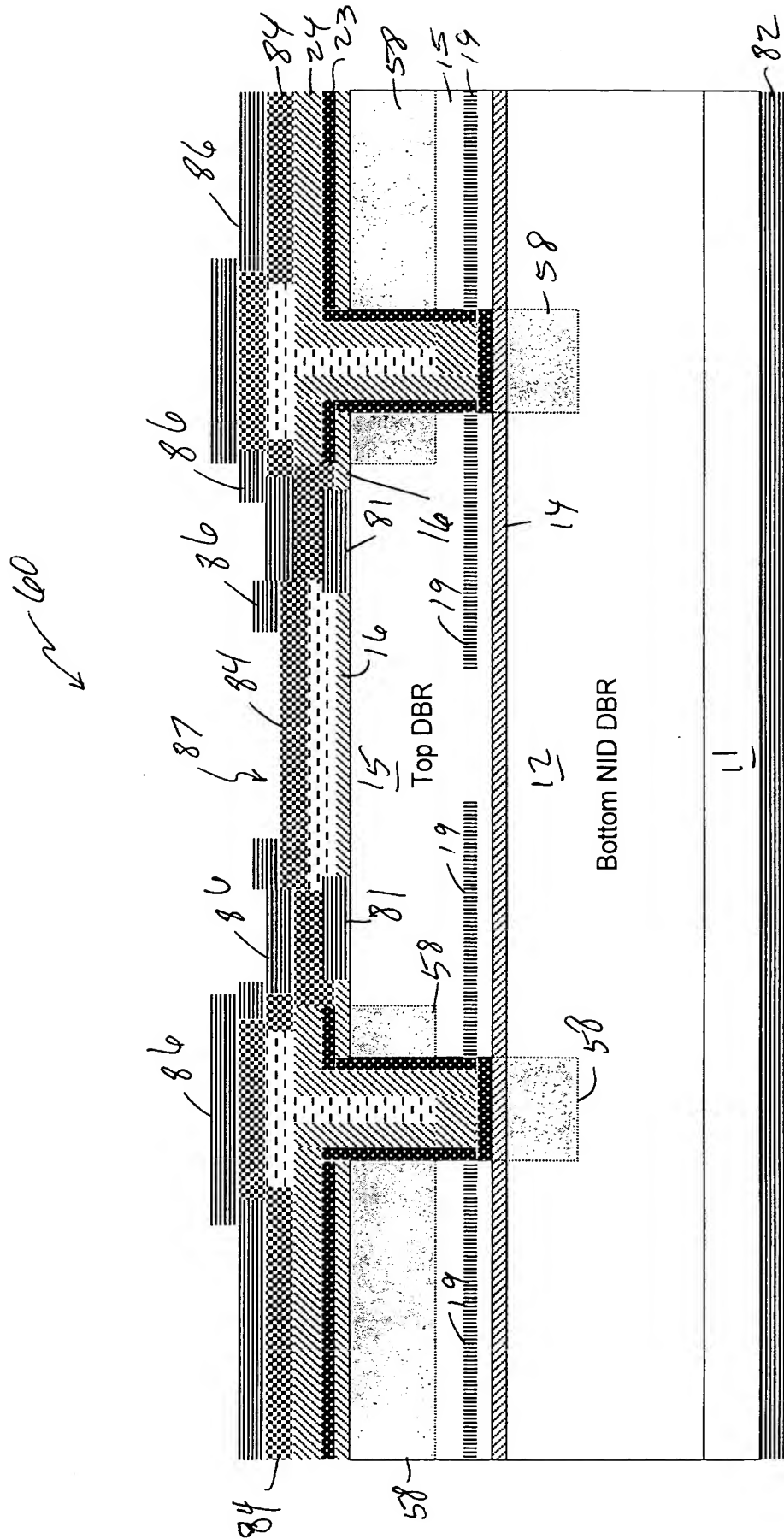


FIGURE 104



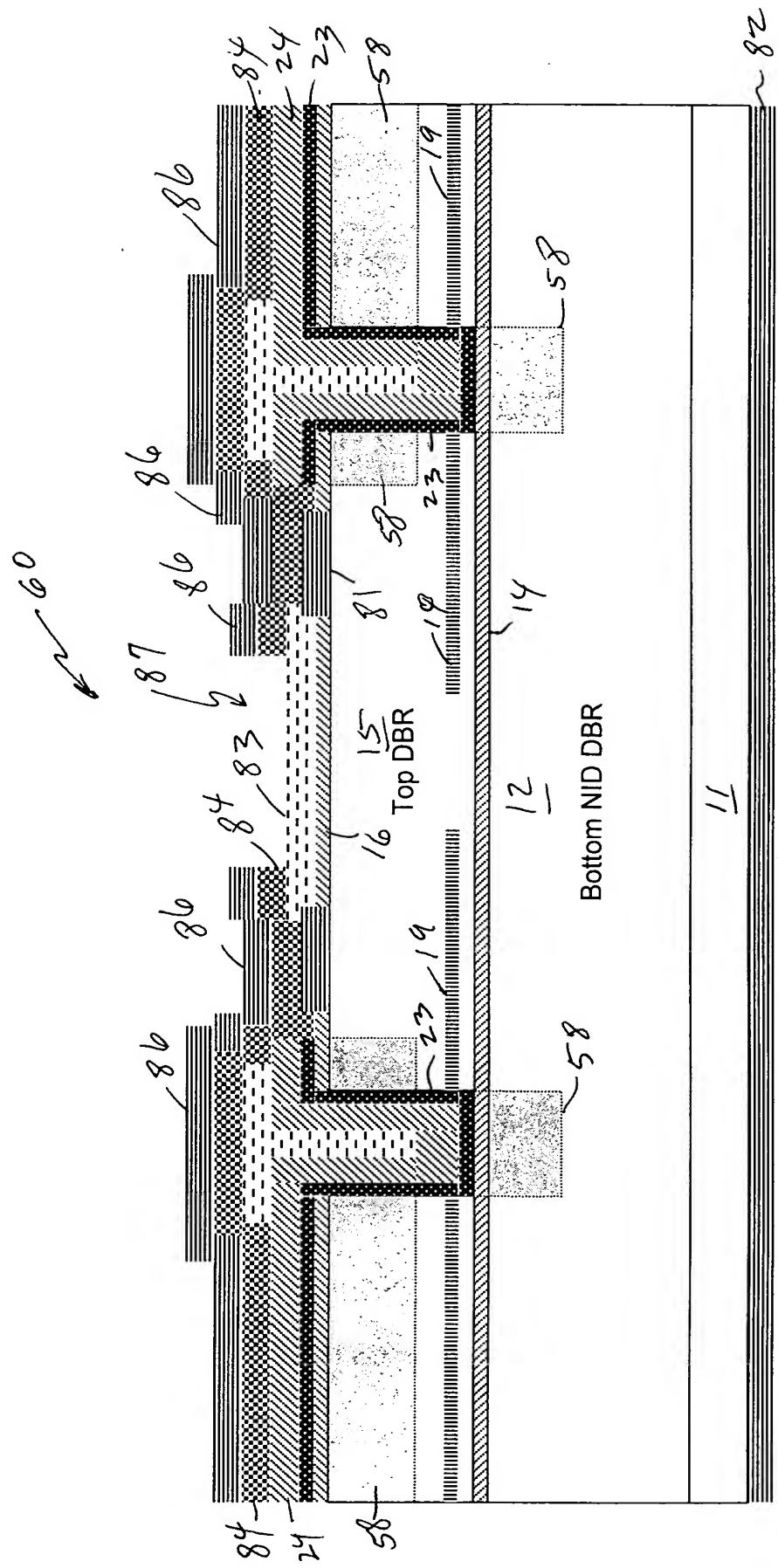


FIGURE 106

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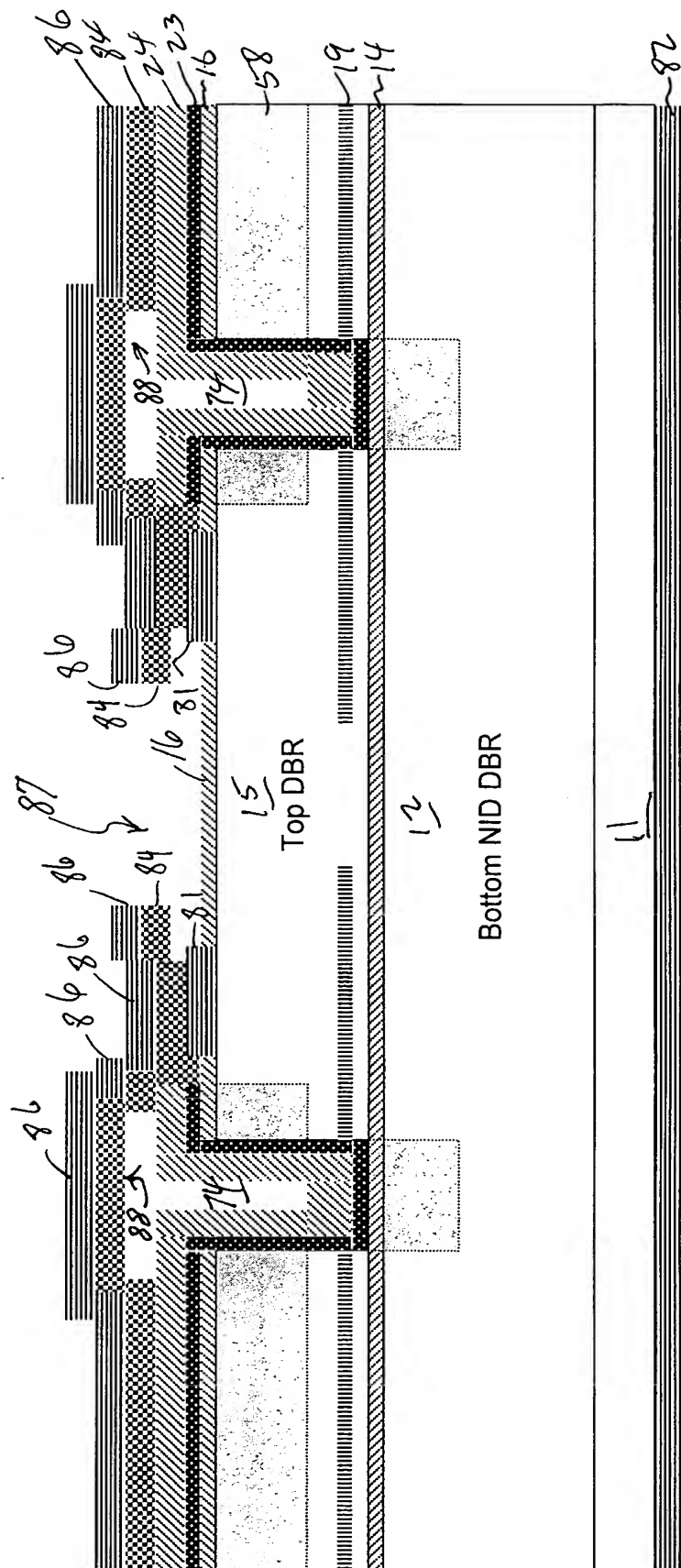


FIGURE 107

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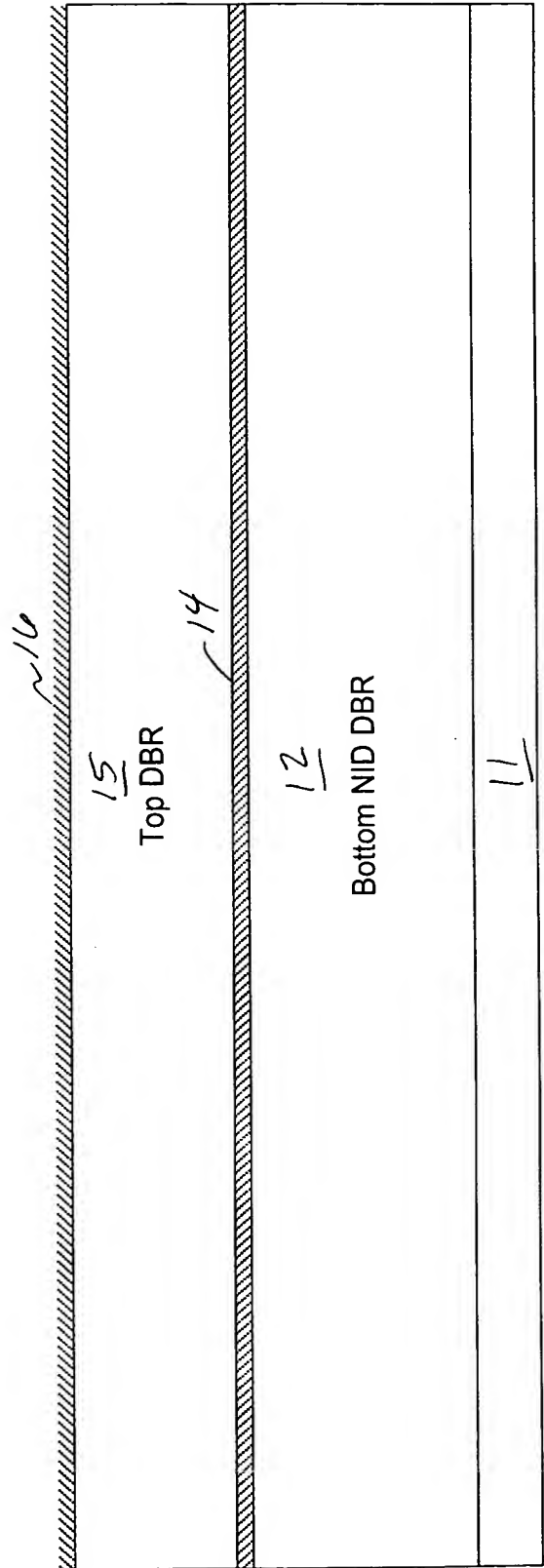


FIGURE 108

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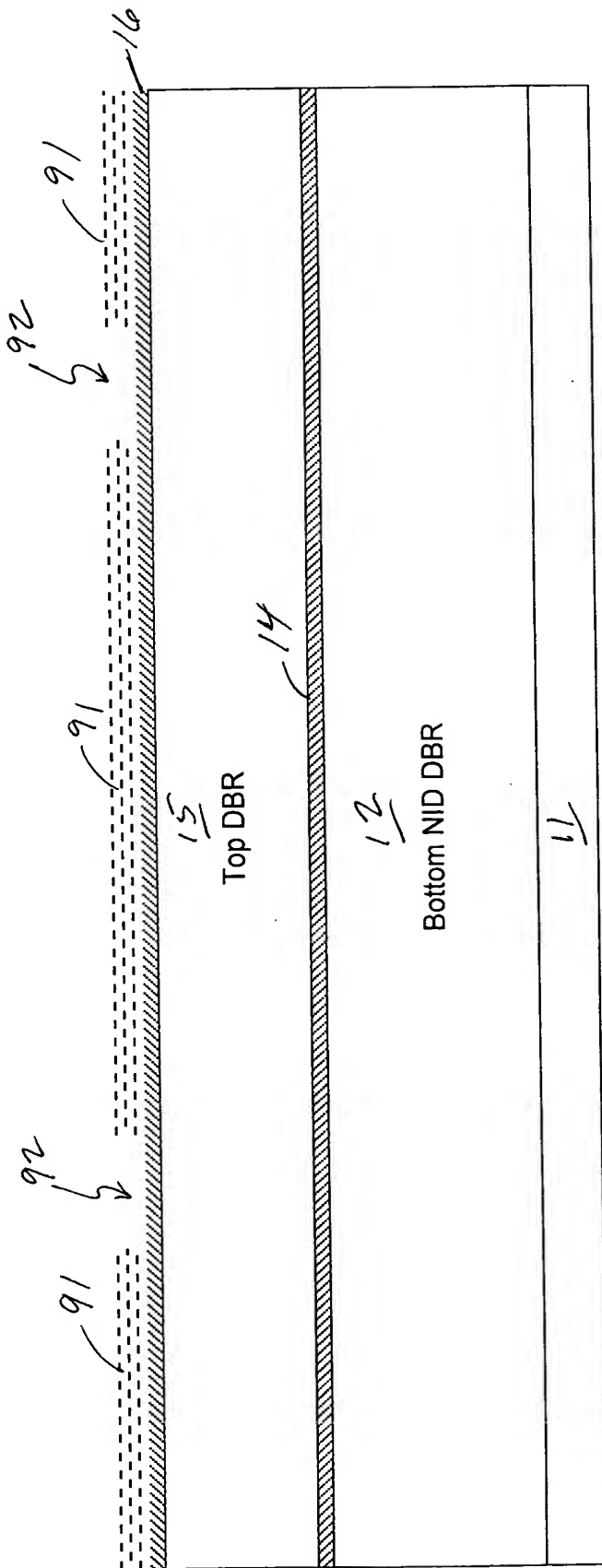


FIGURE 109

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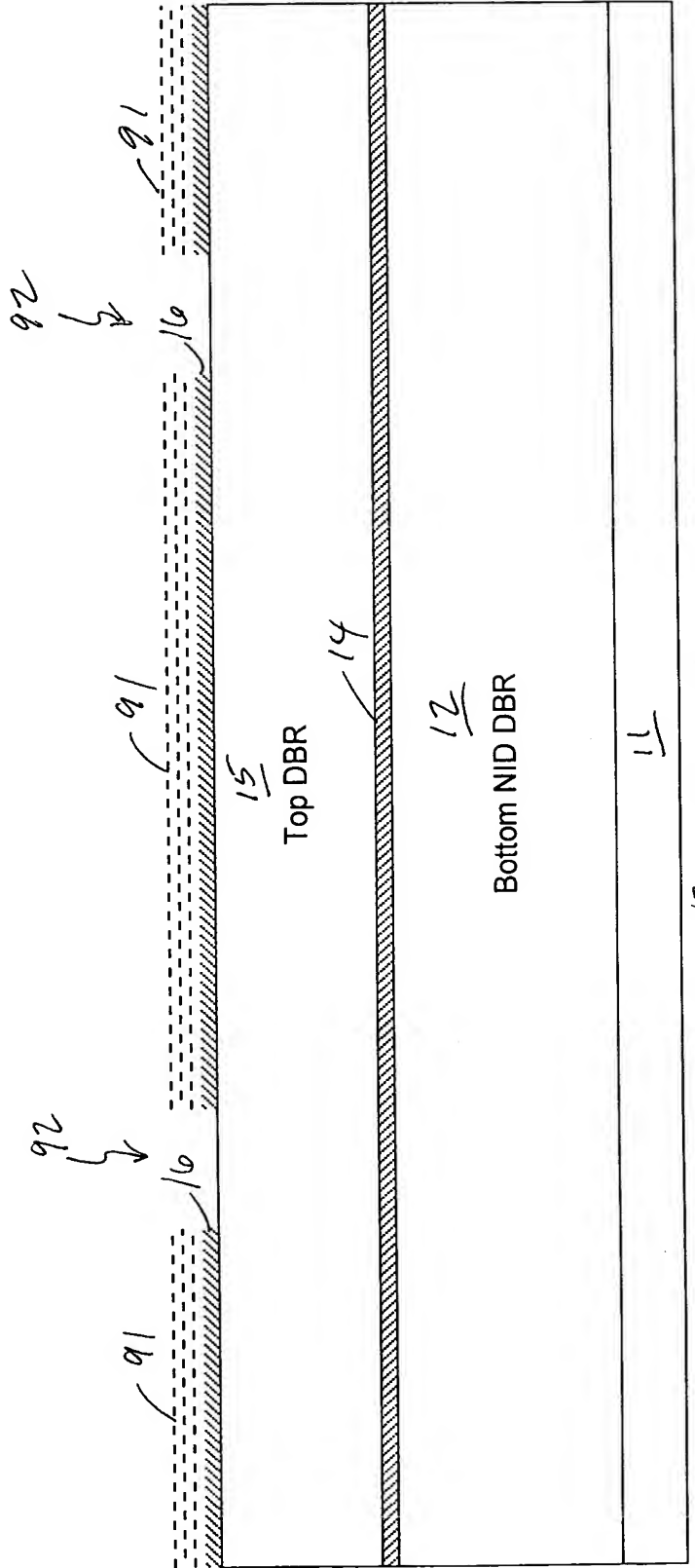


FIGURE 110

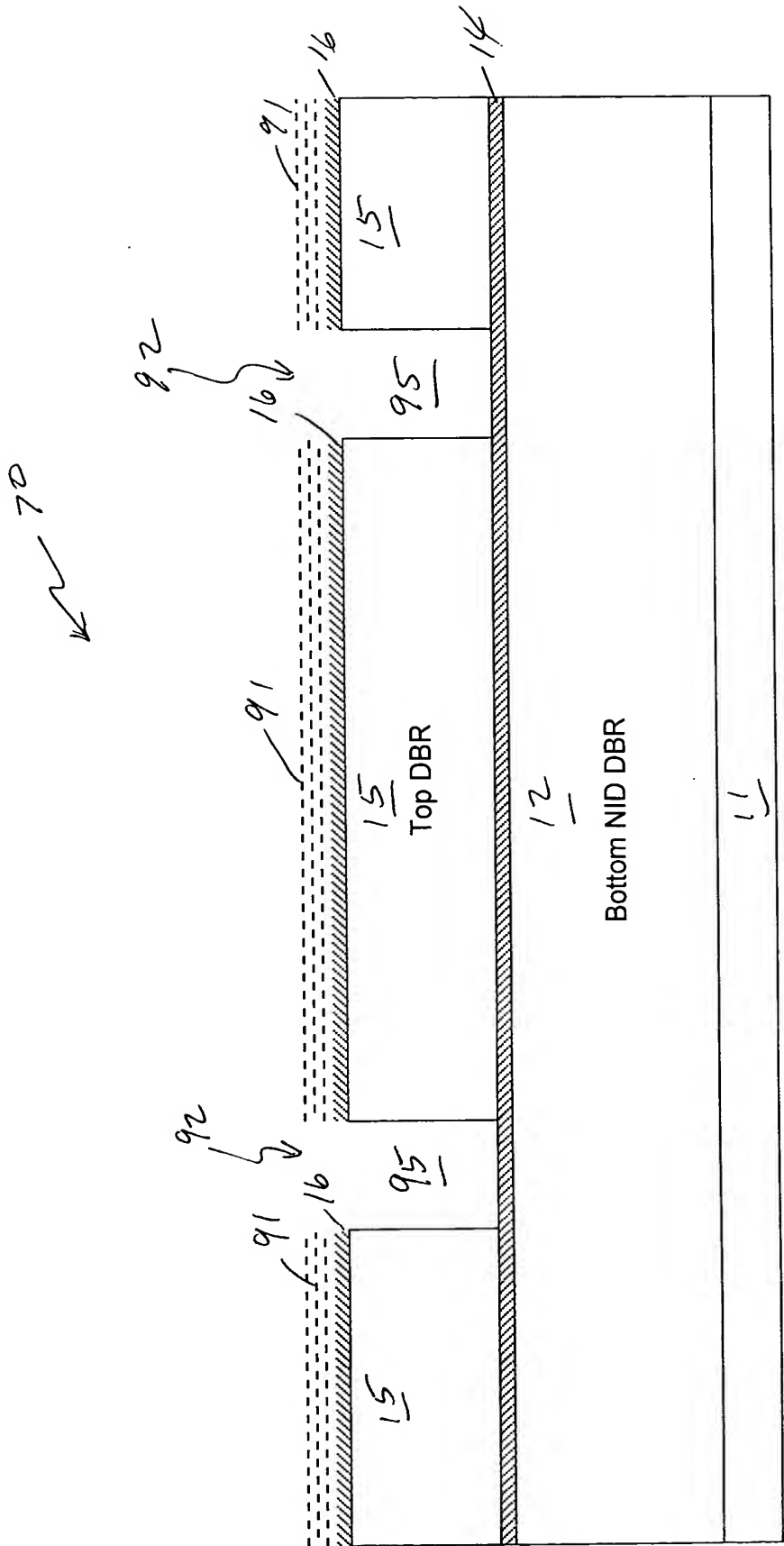


FIGURE 111

70 ↗

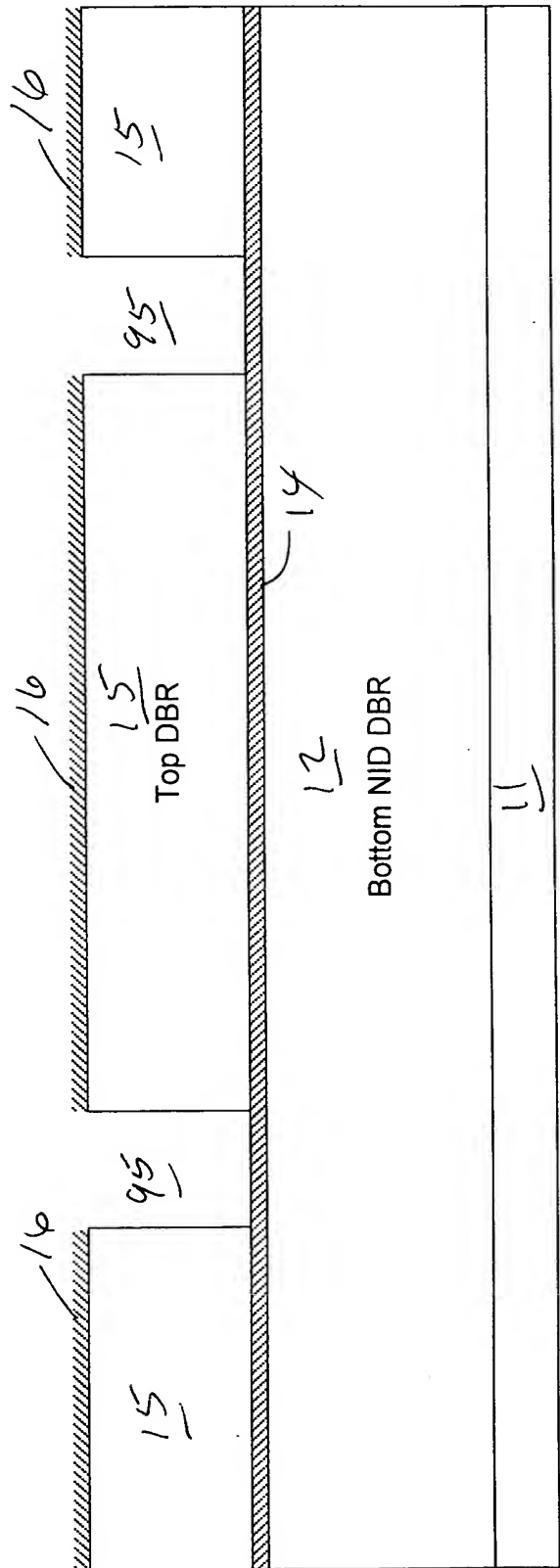


FIGURE 112

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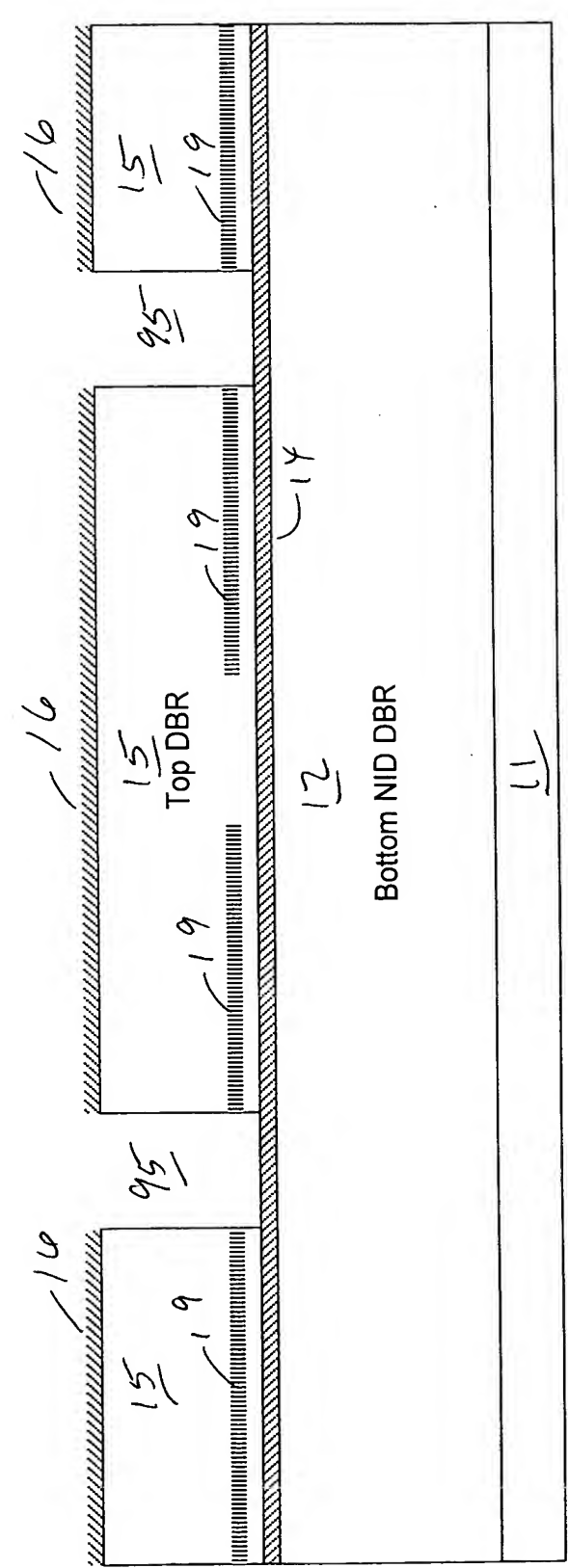


FIGURE 113

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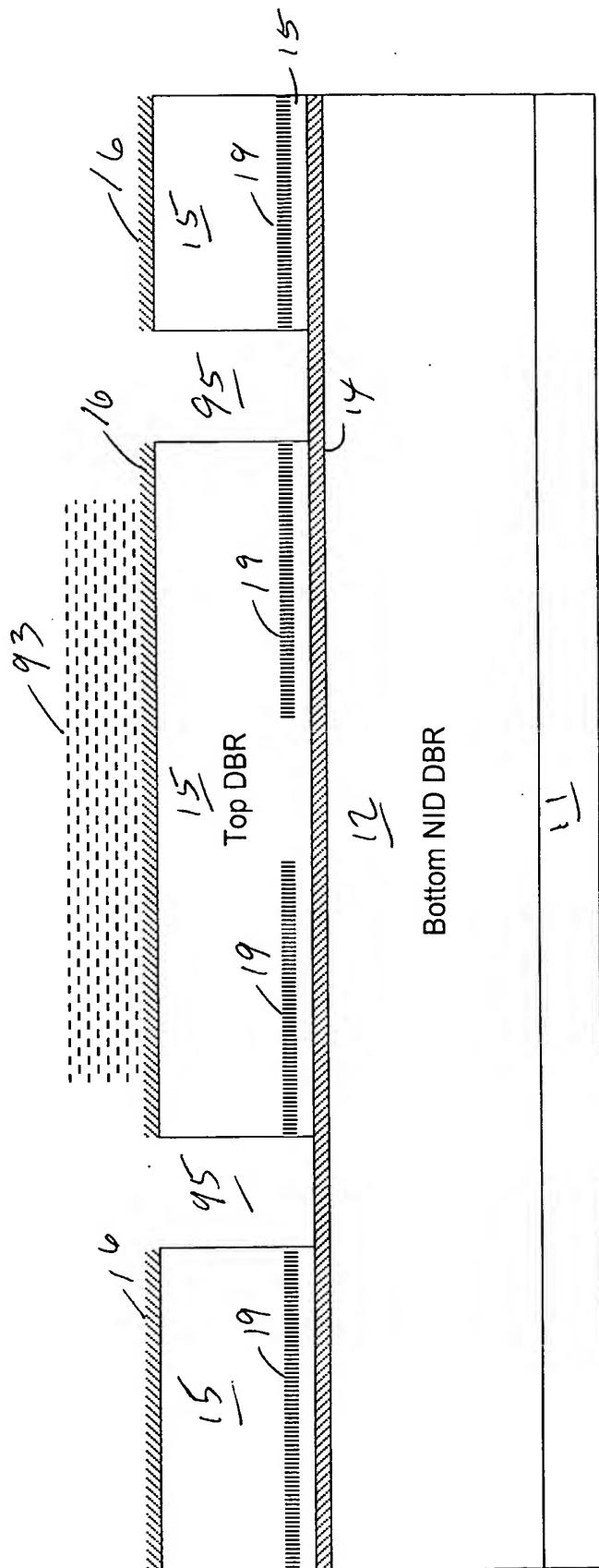
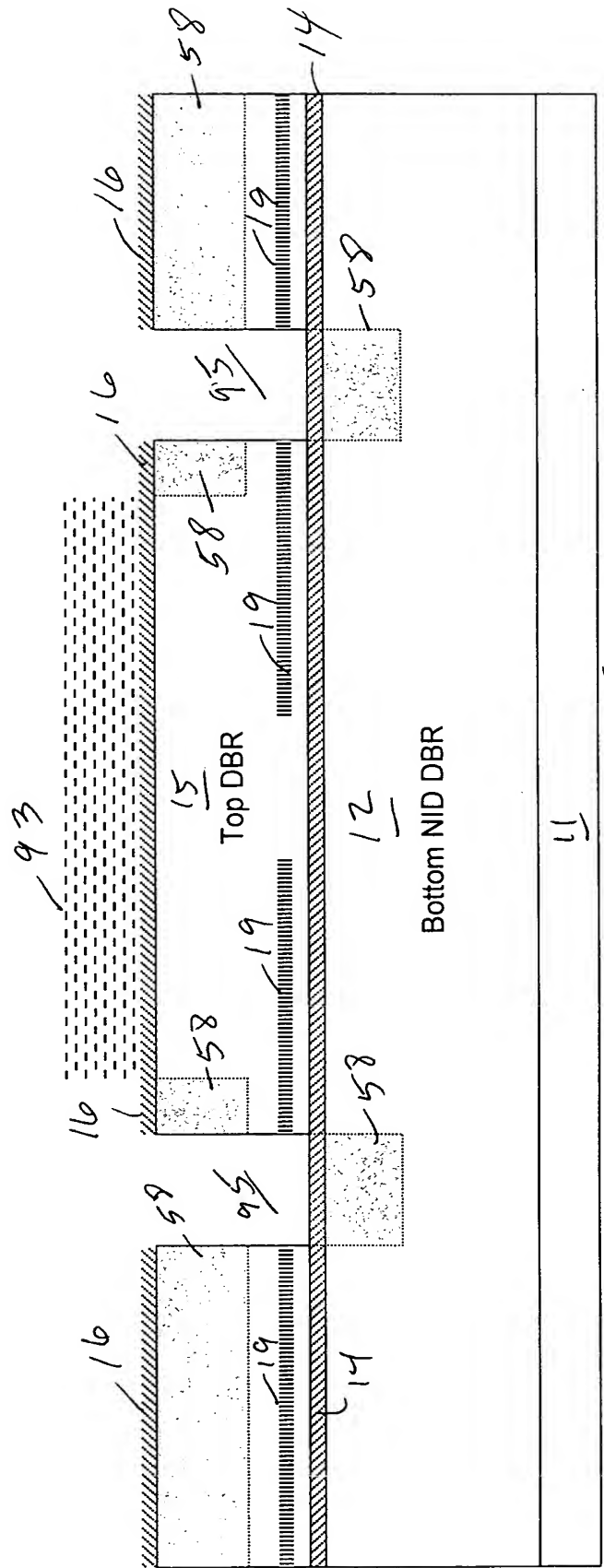


FIGURE 114

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FIGURE 115

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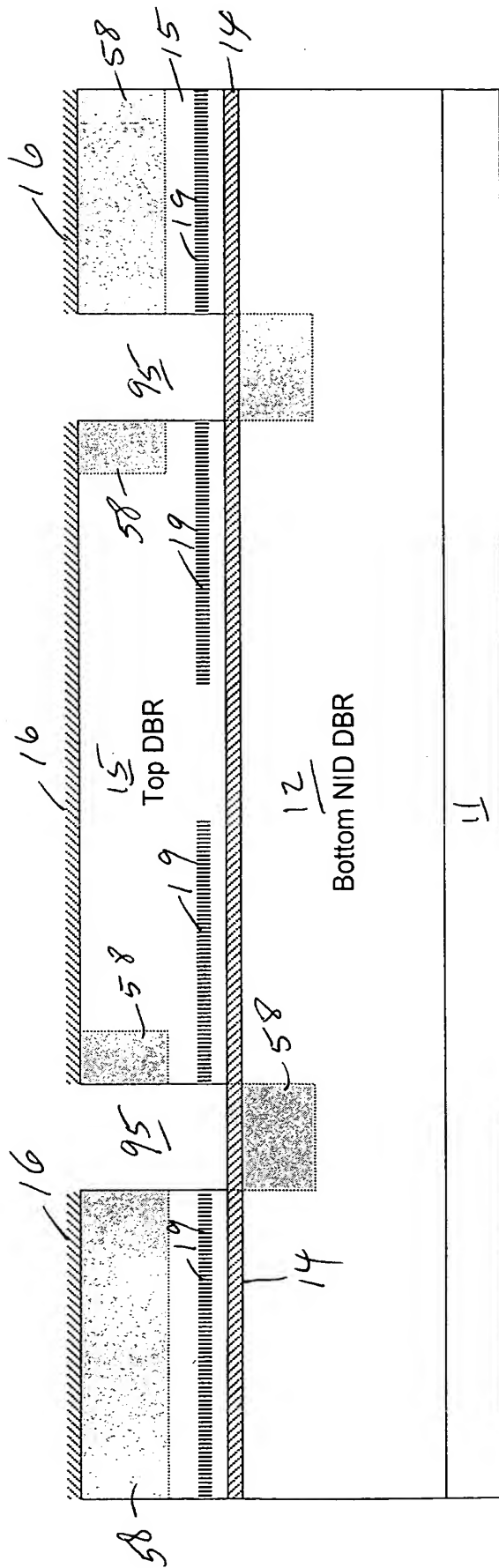


FIGURE 110

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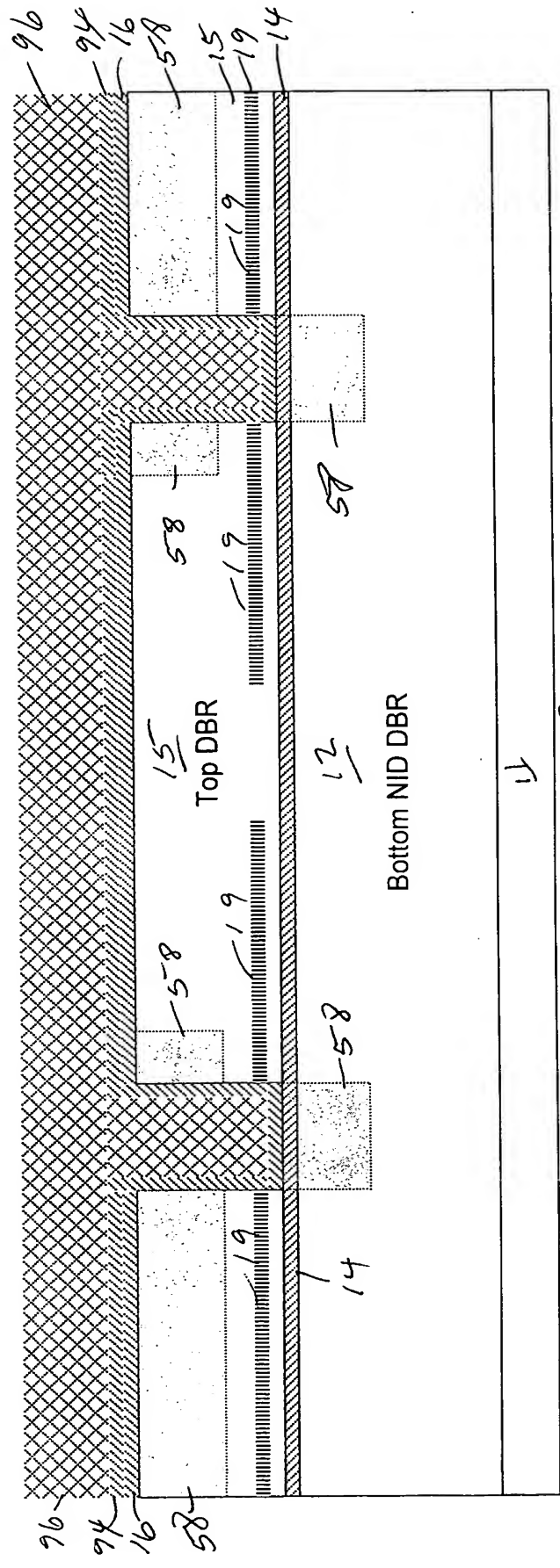
Top DBR

Bottom NID DBR

11, 12, 13, 14, 15, 16, 17, 18, 19, 58, 94, 95

FIGURE 117

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FIGURE 118

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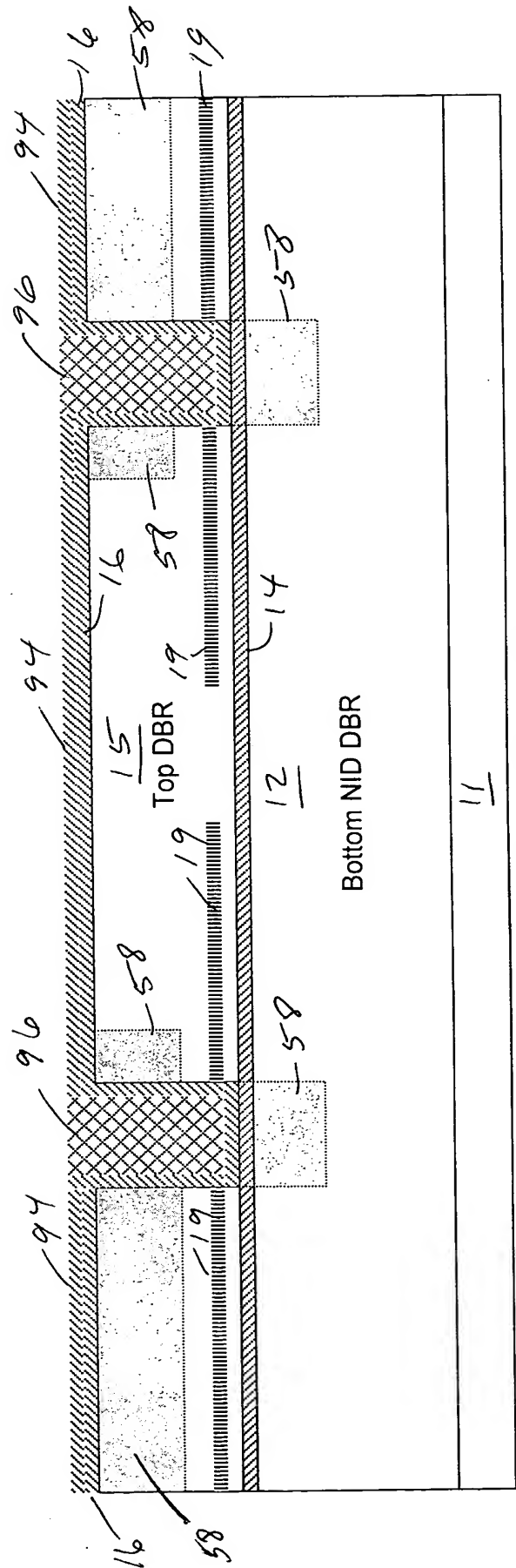


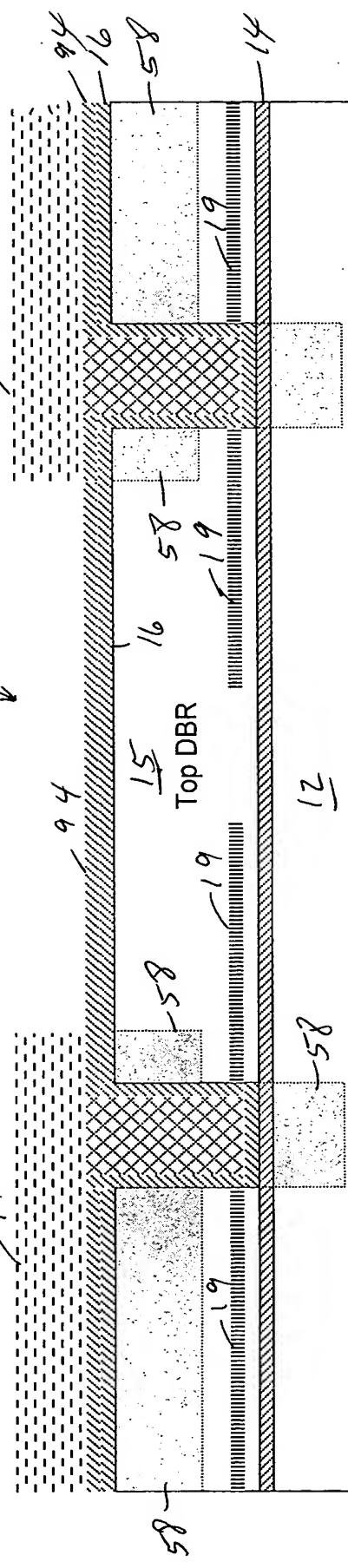
FIGURE 119

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97

94



Bottom NID DBR

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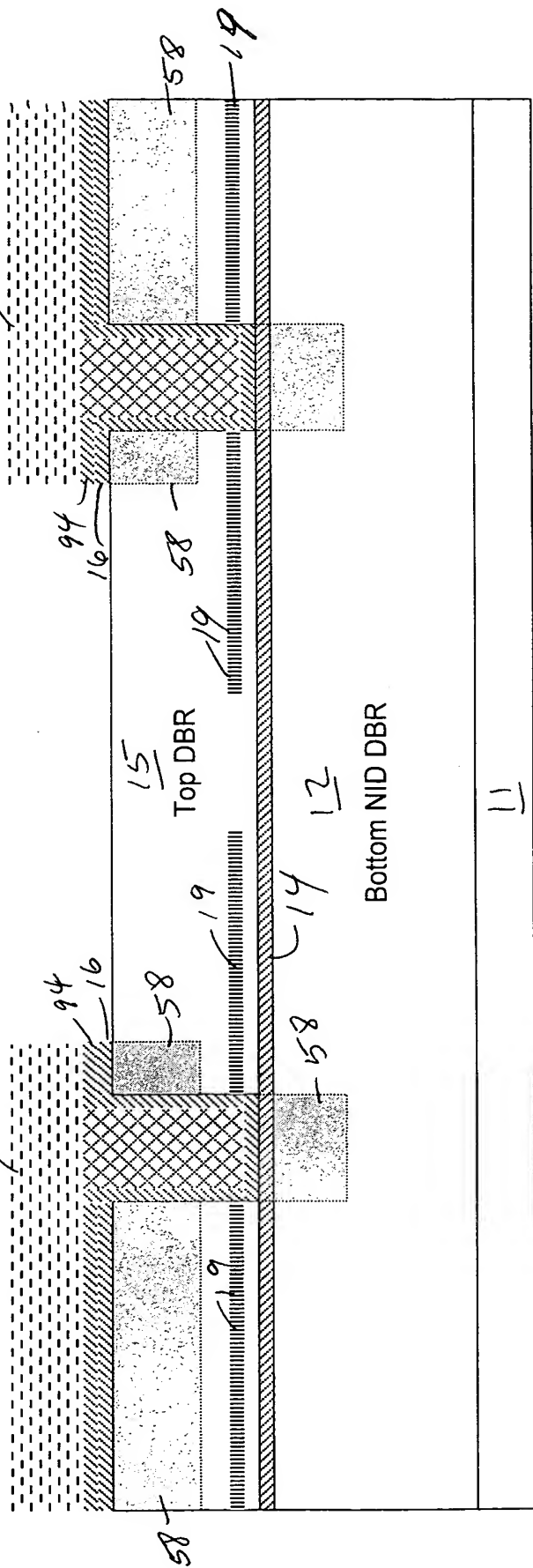
FIGURE 120

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97 ↘



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FIGURE 121

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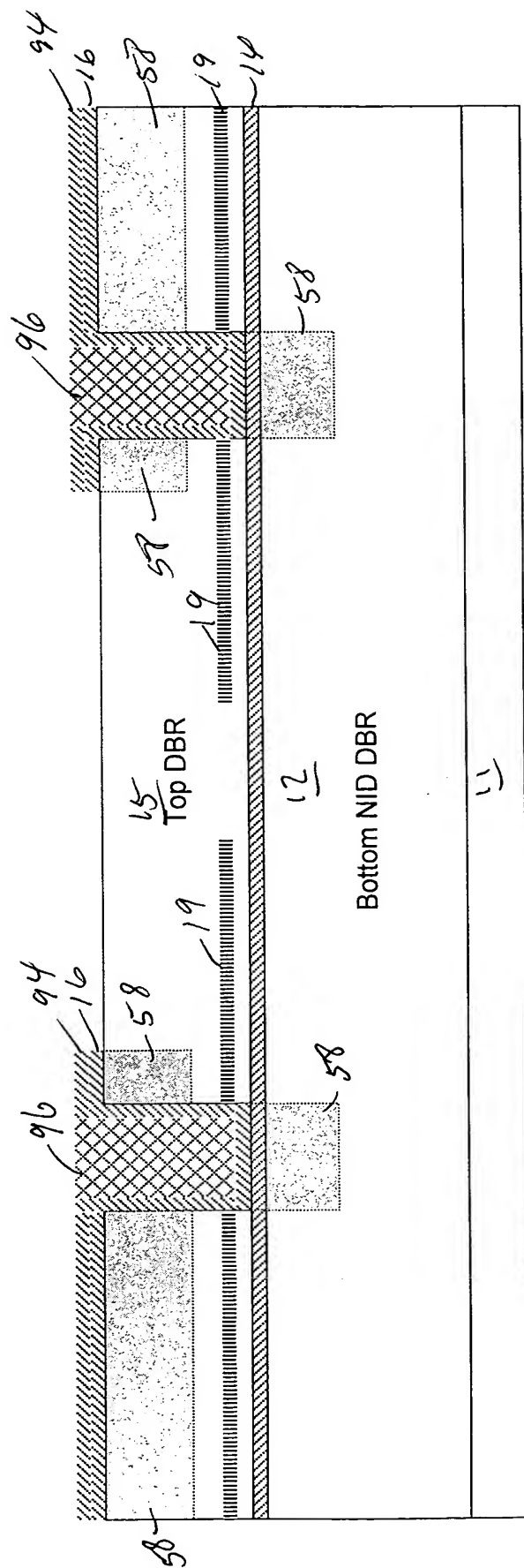


FIGURE 122

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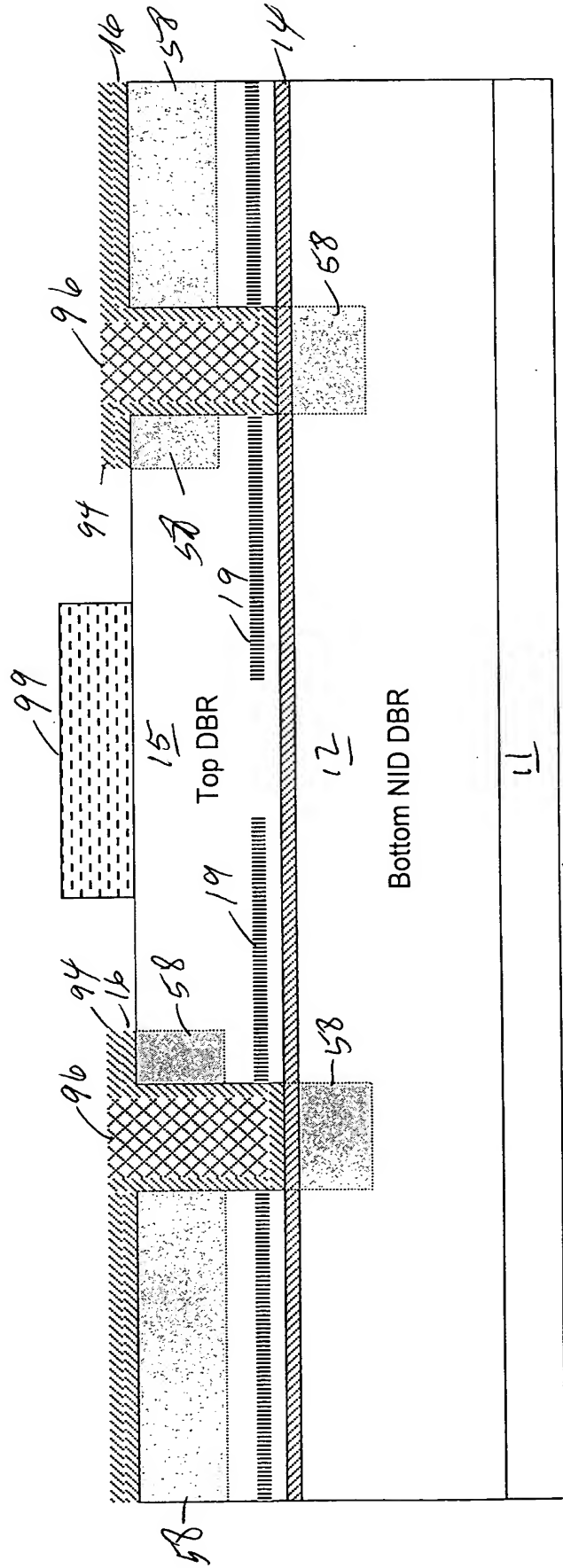
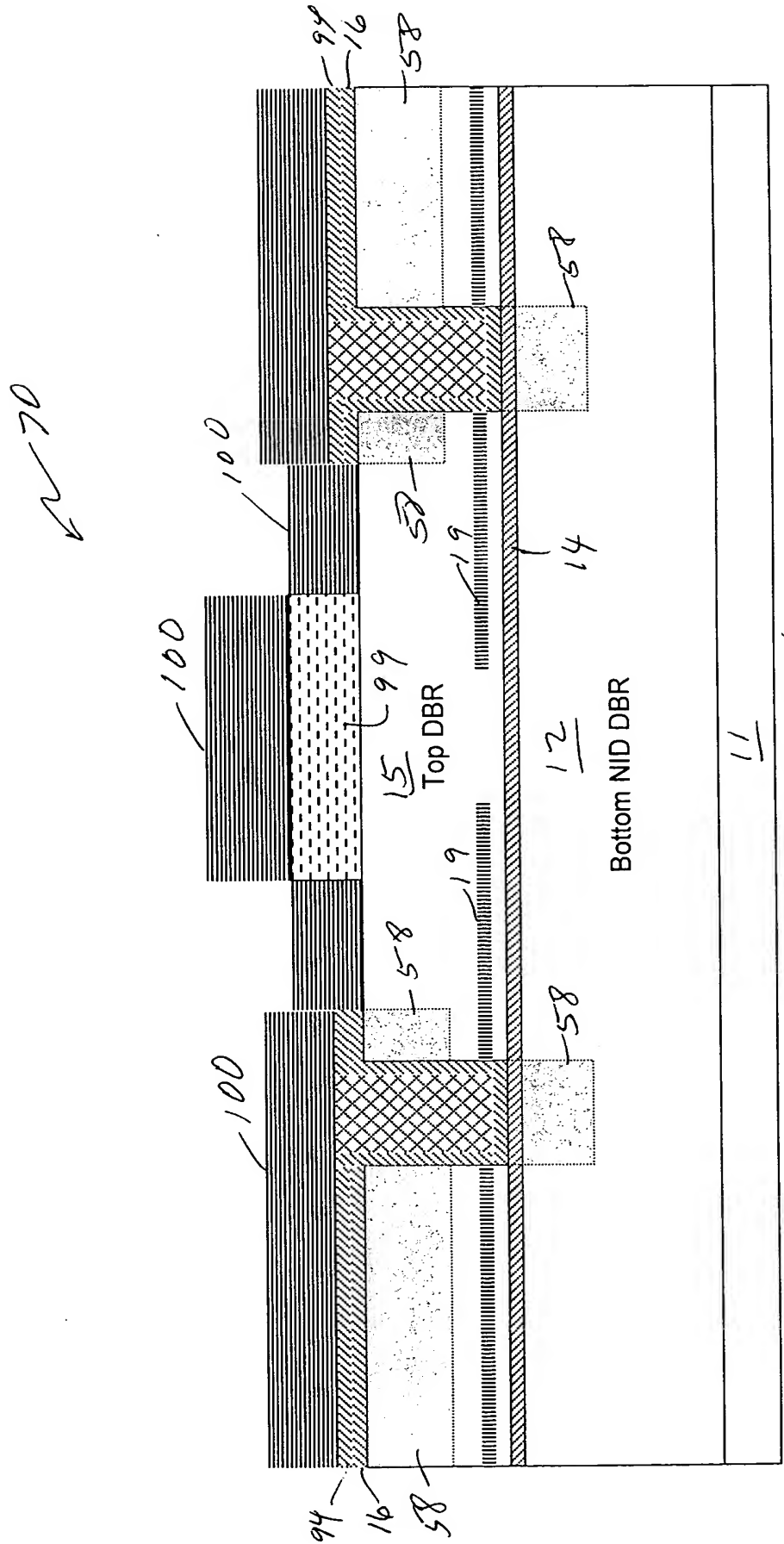


FIGURE 123



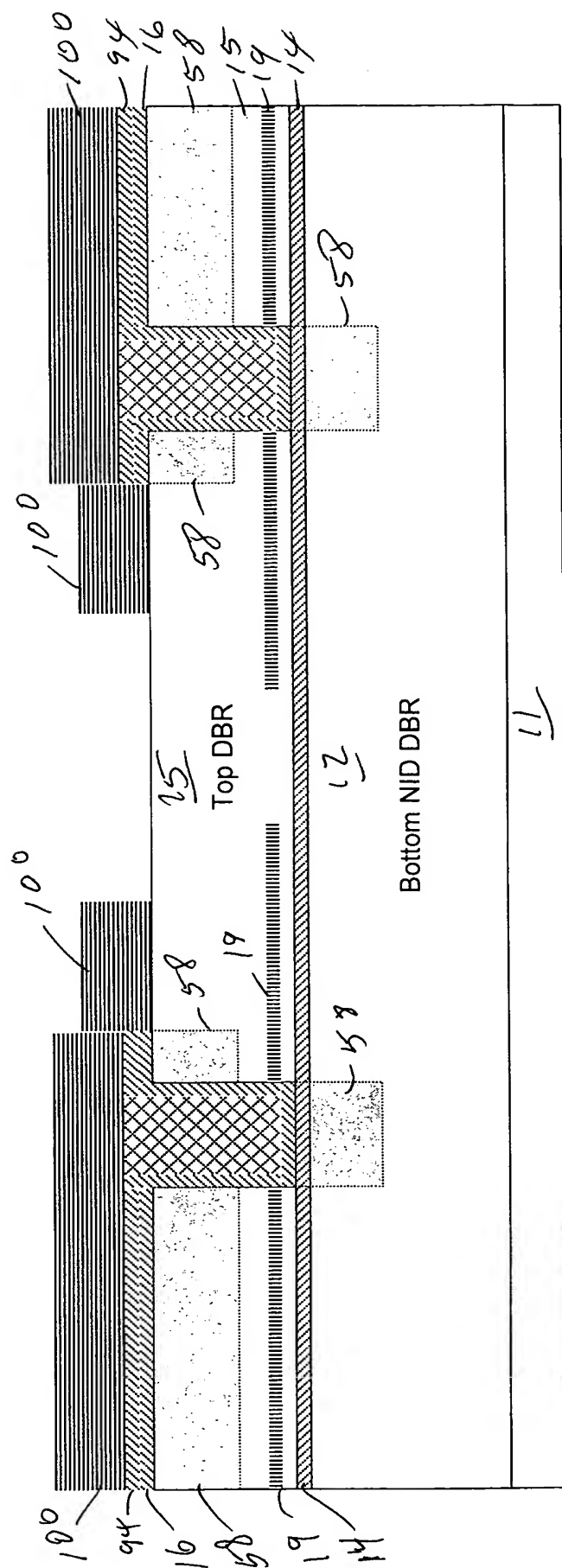
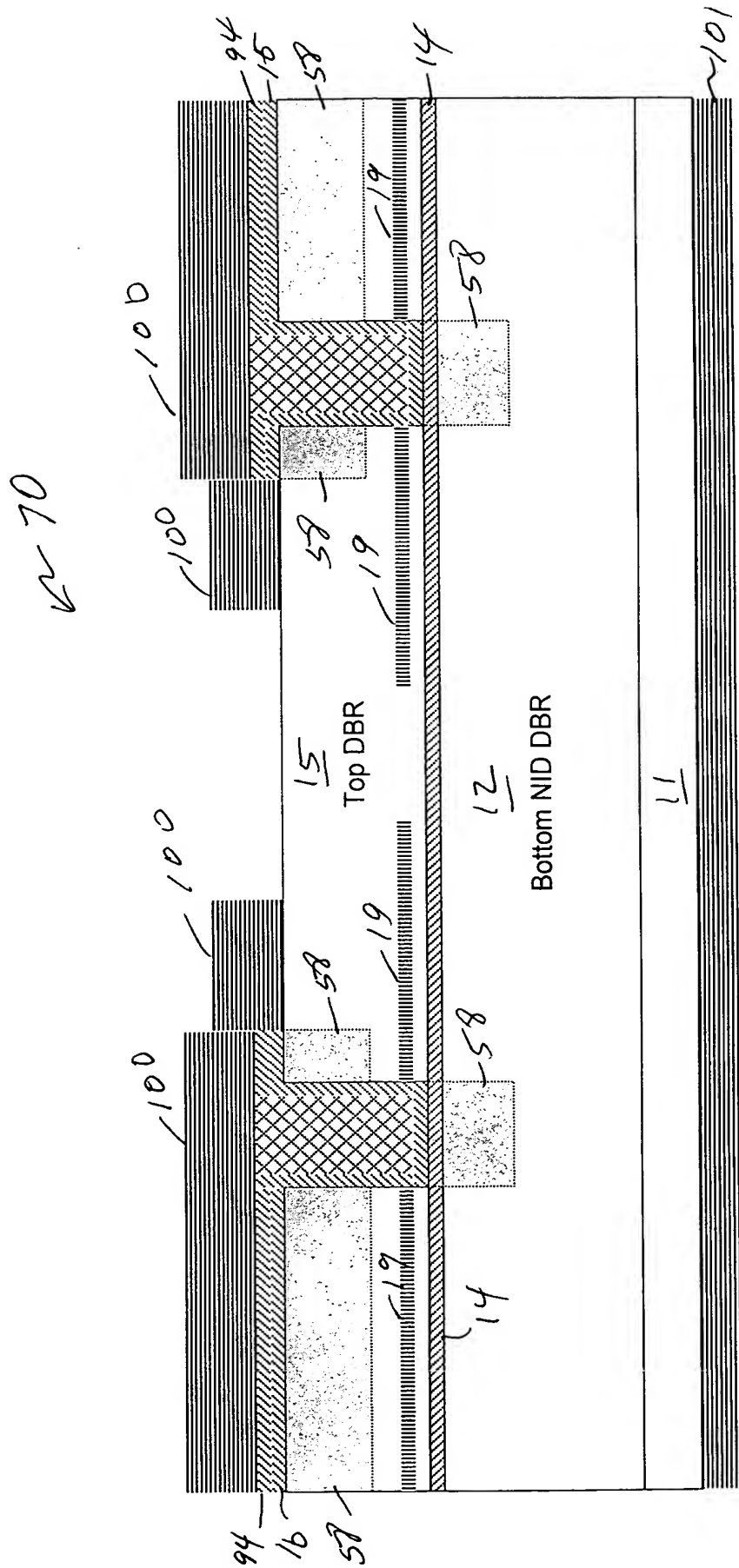


FIGURE 125



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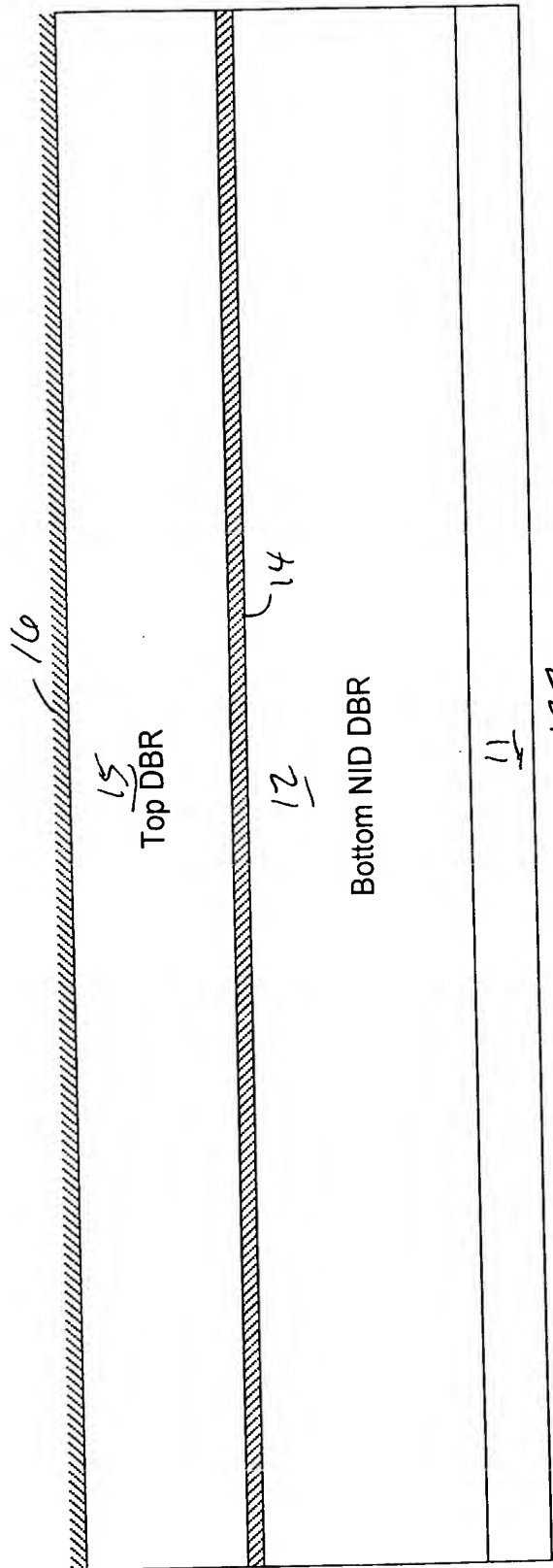


FIGURE 127

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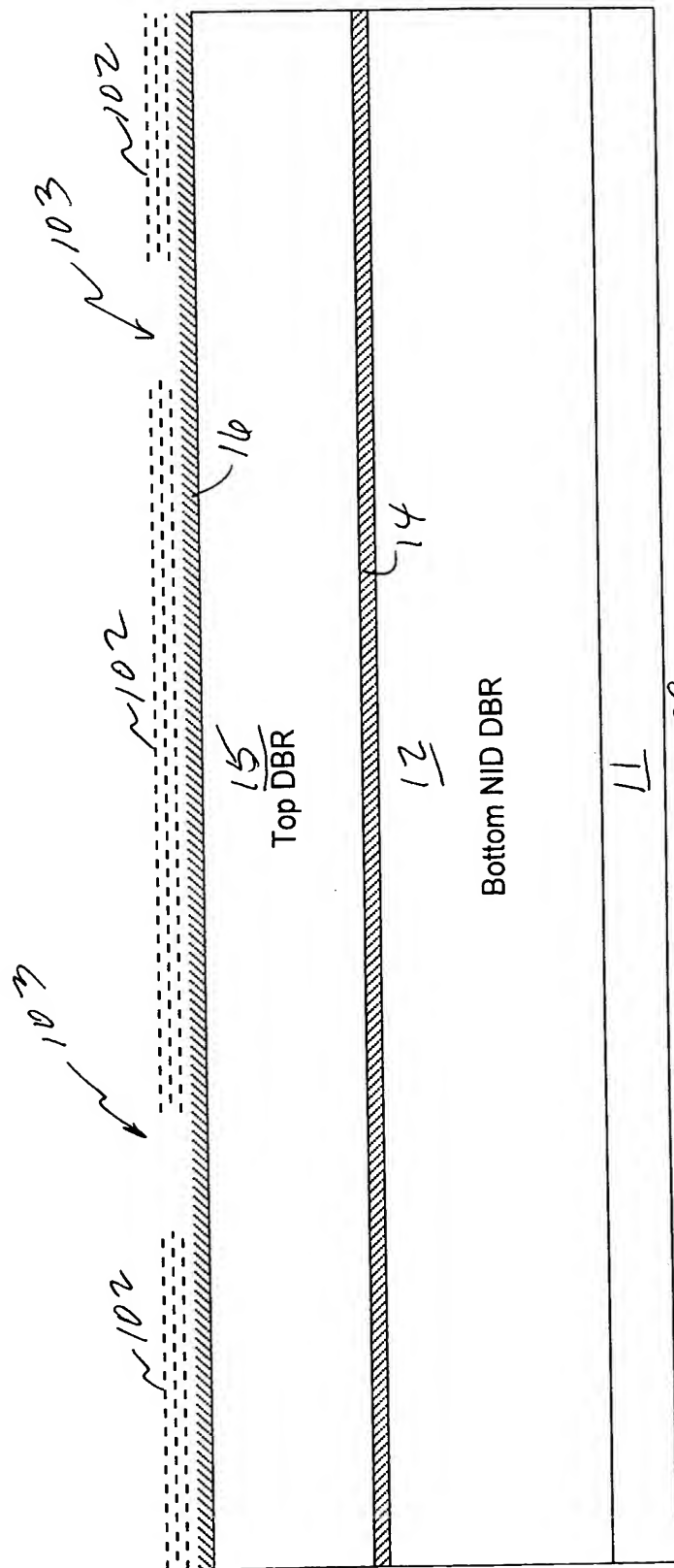
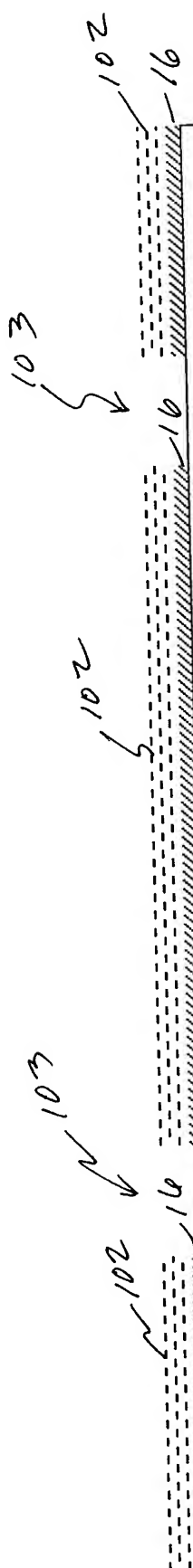


FIGURE 128

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Top DBR

Bottom NID DBR

FIGURE 129

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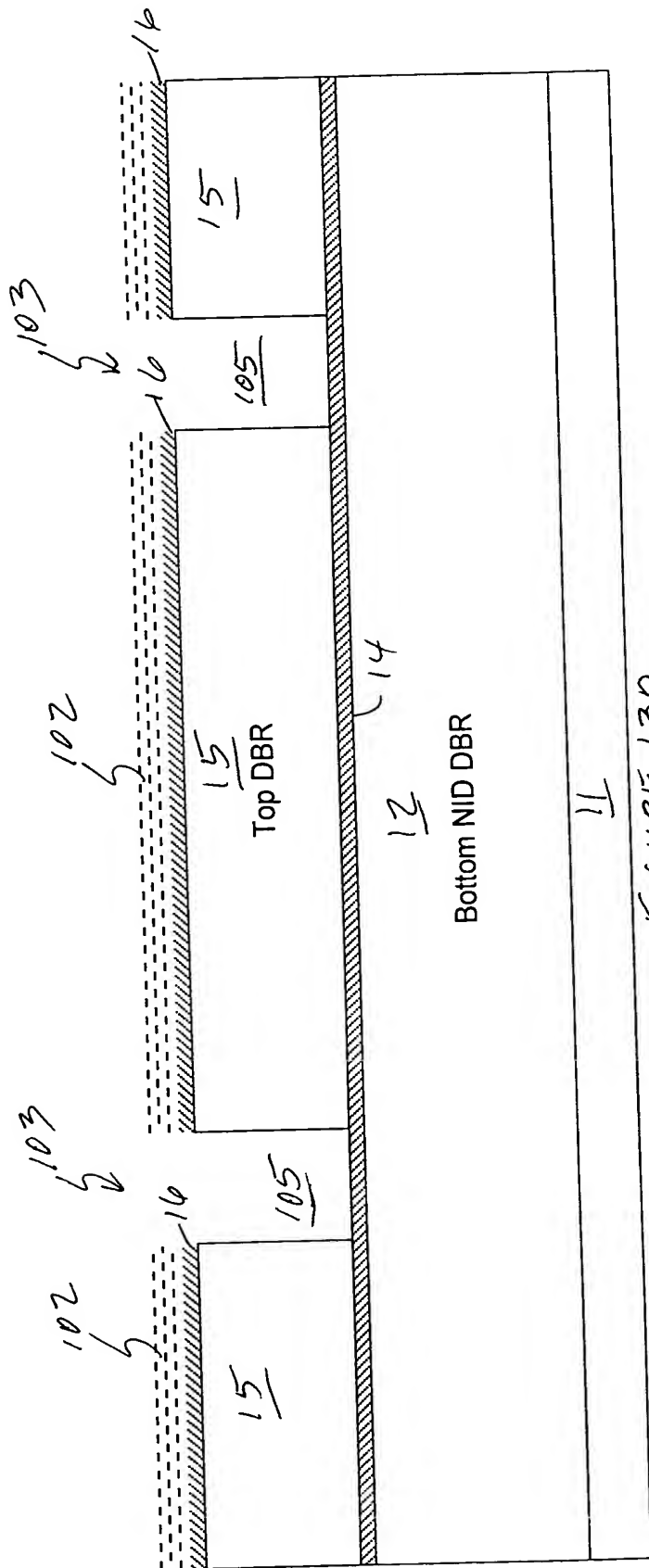


FIGURE 130

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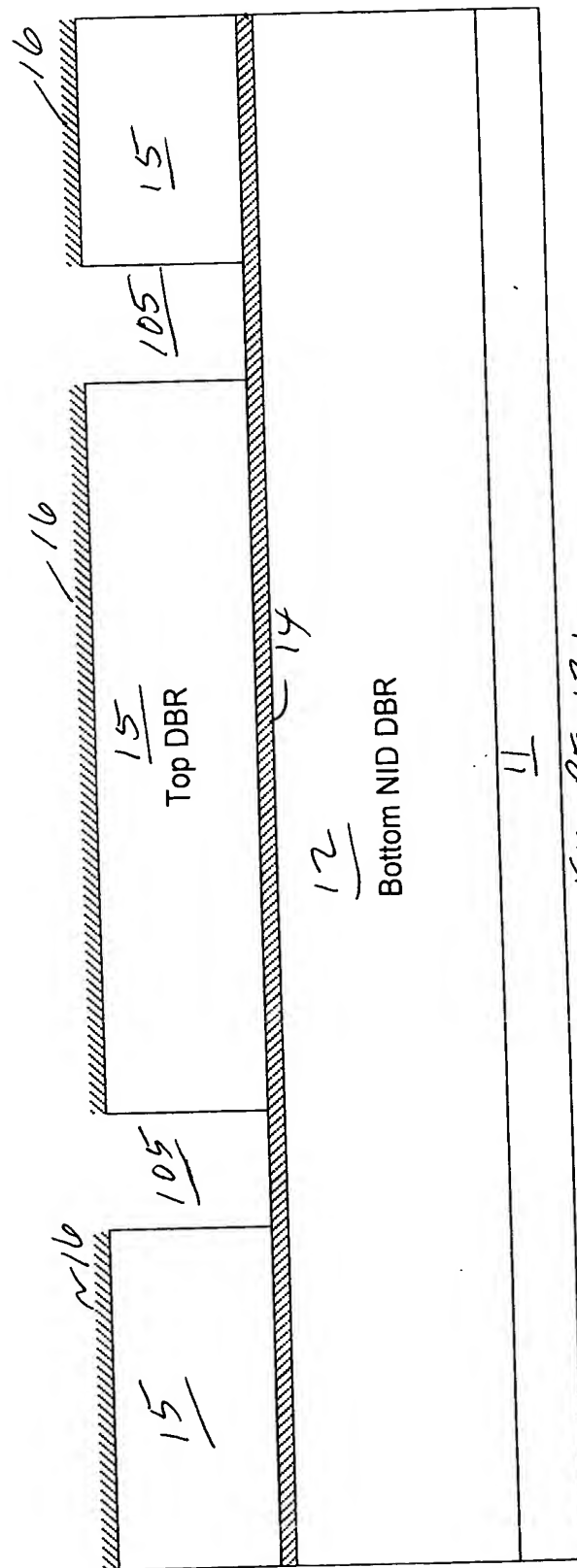


FIGURE 131

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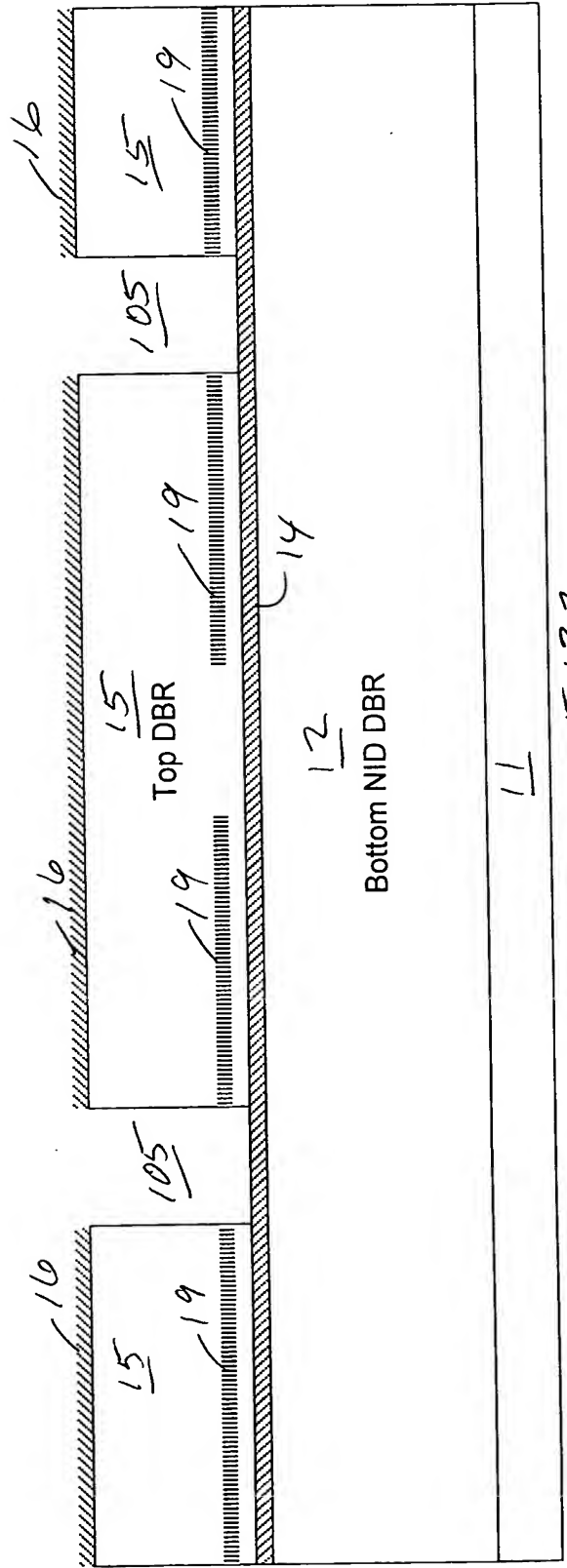


FIGURE 132

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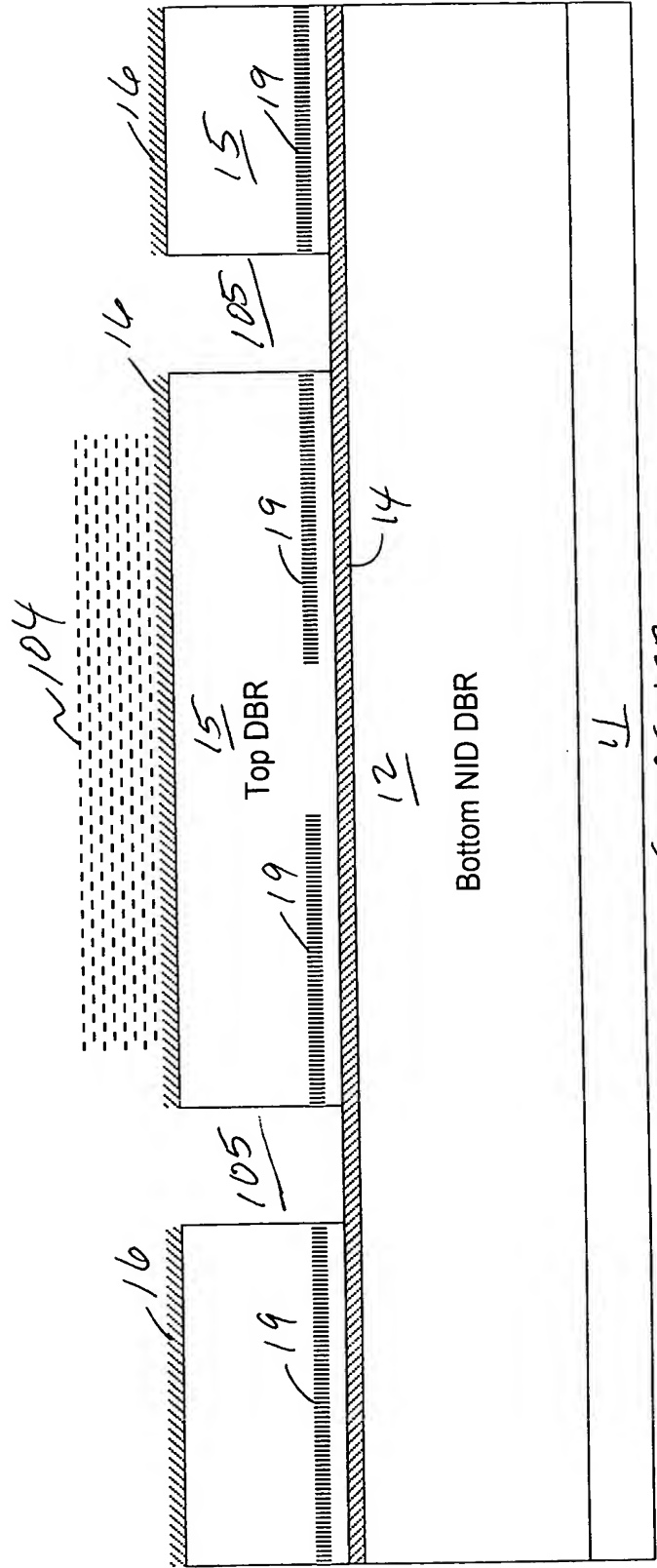
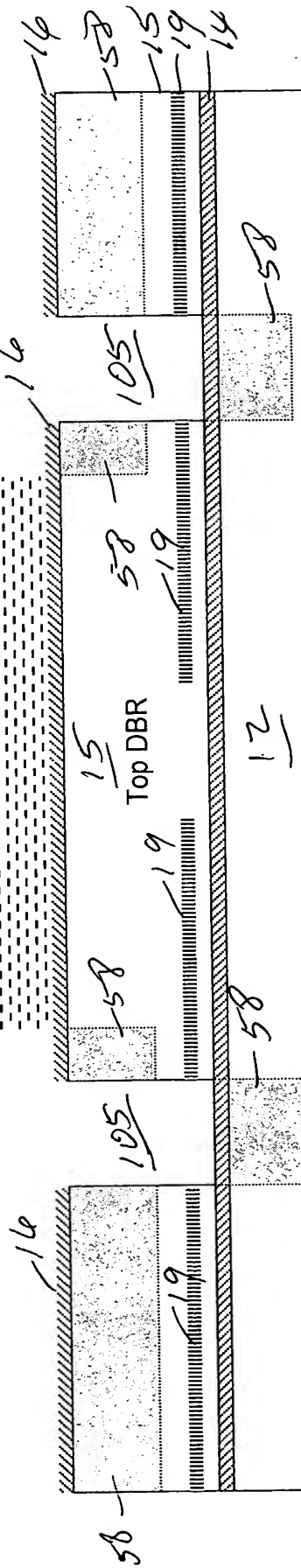


FIGURE 133

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FIGURE 134

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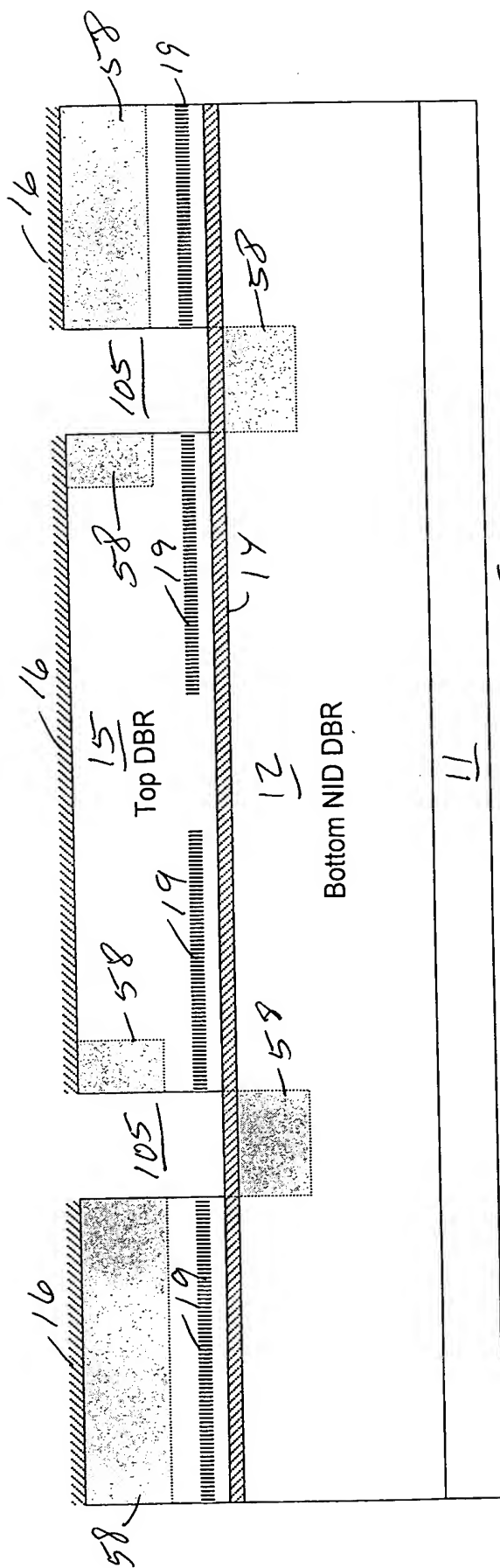


FIGURE 135

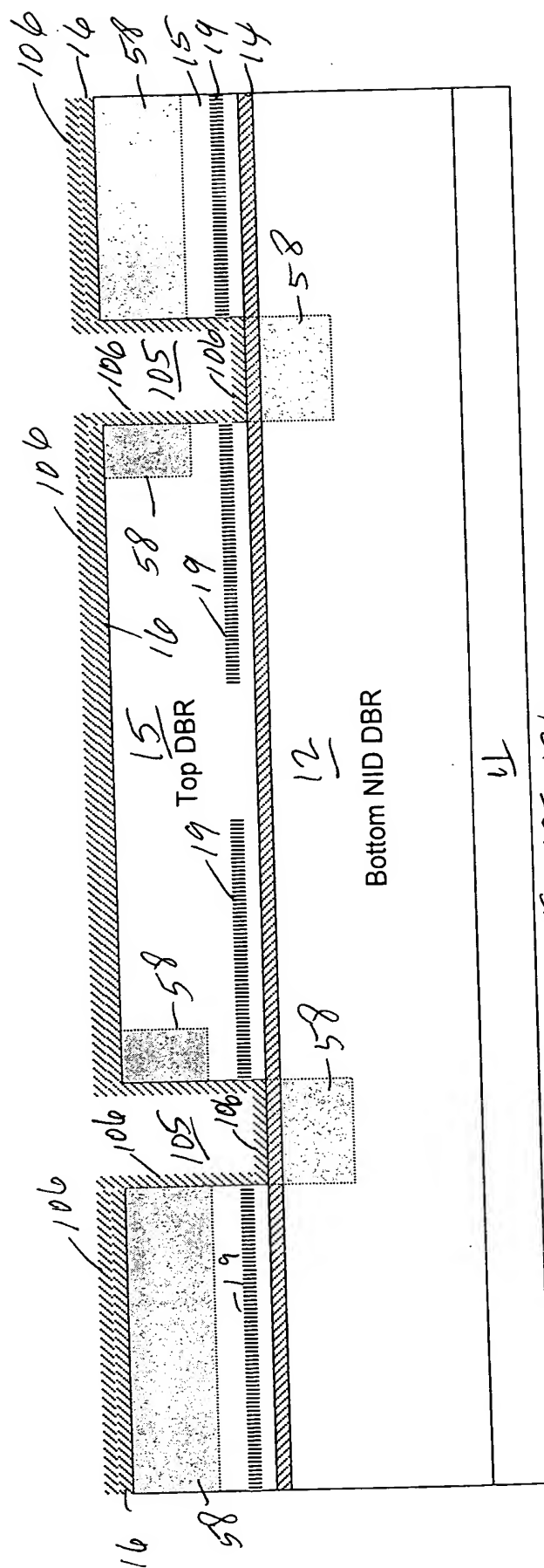


FIGURE 136

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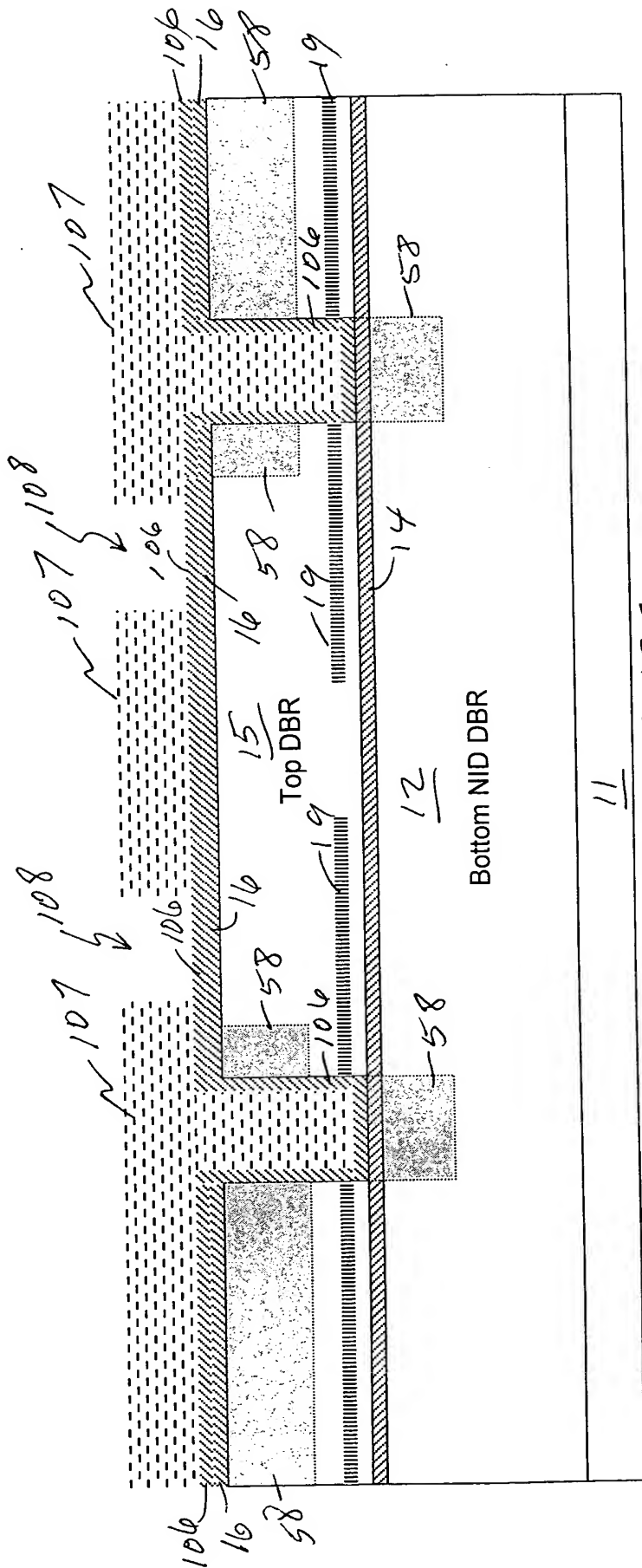


FIGURE 137

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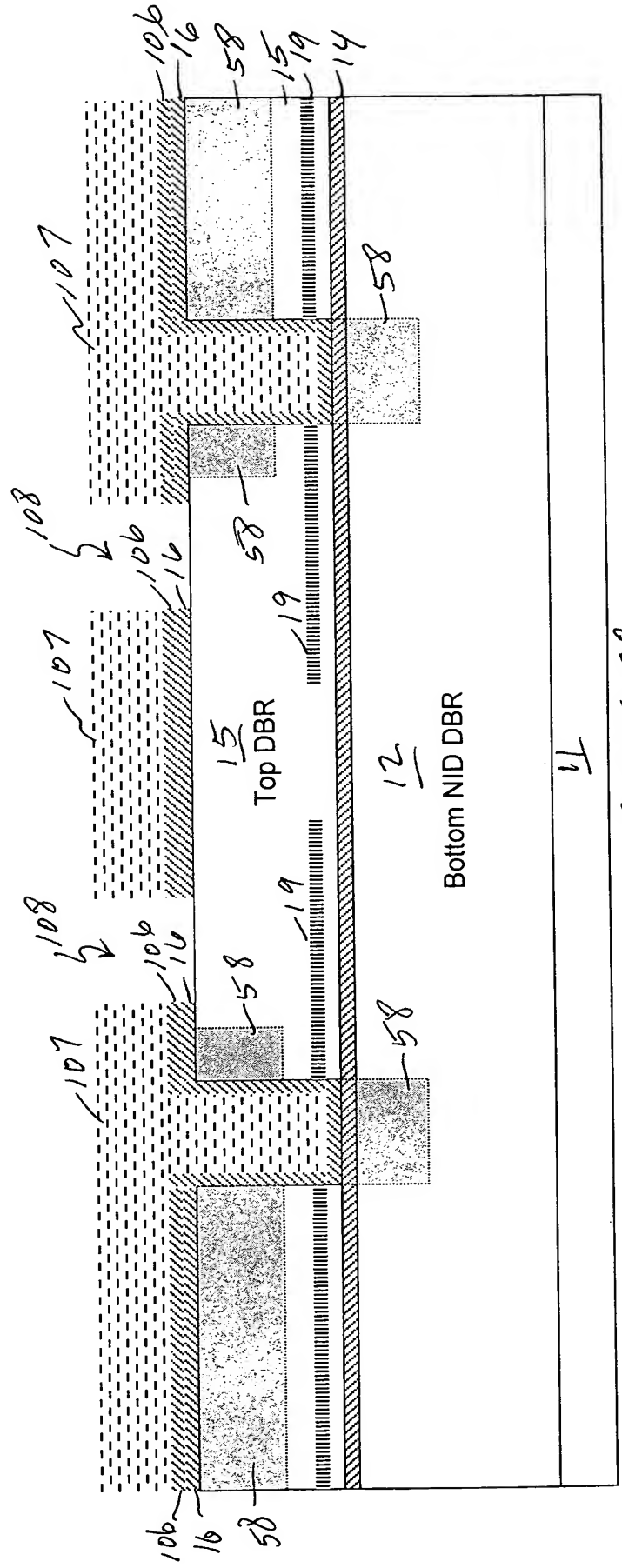


FIGURE 138

FIGURE 139

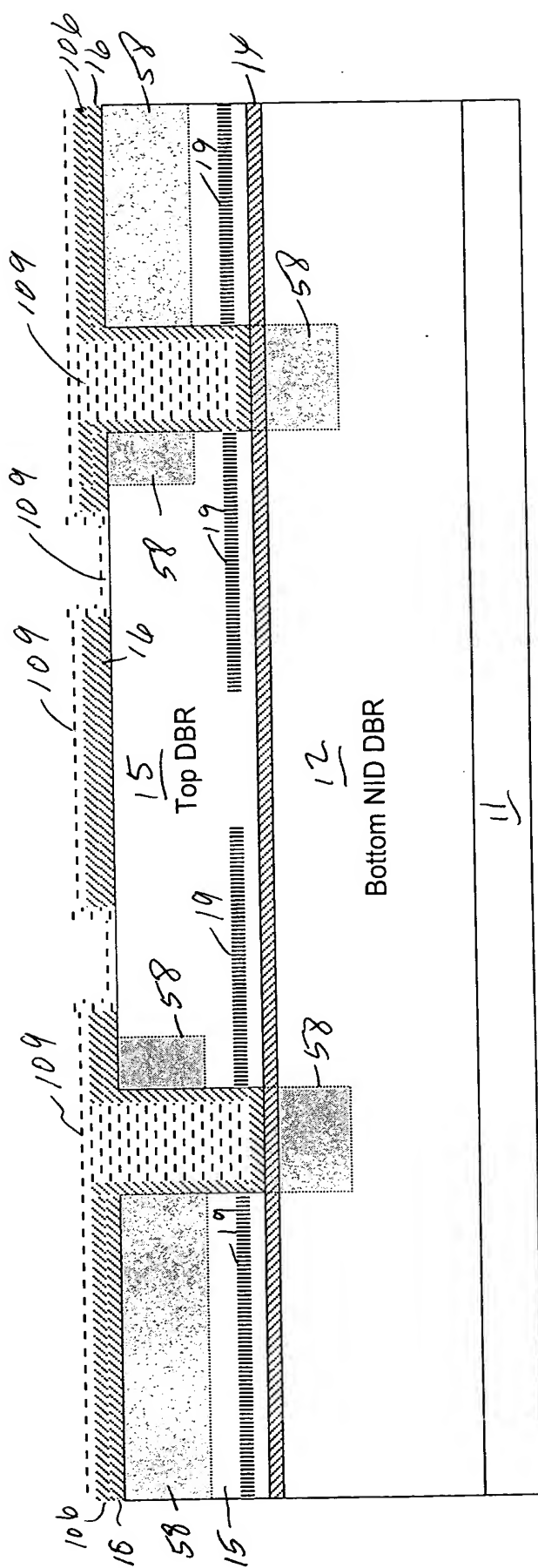


FIGURE 140

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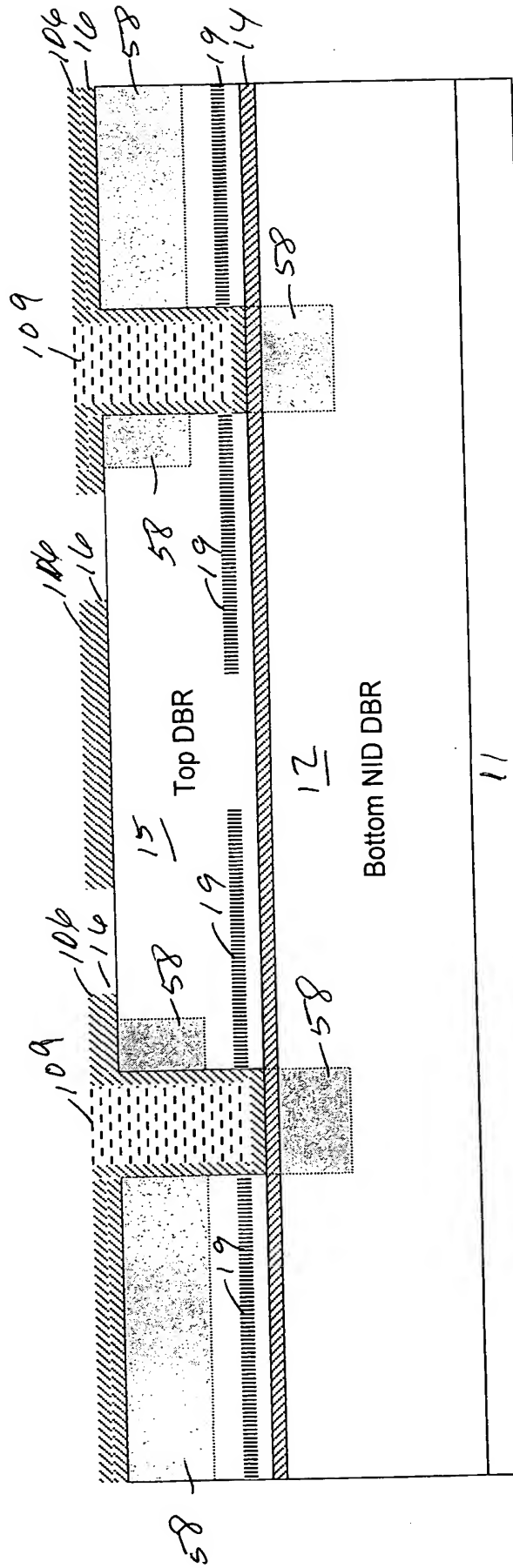
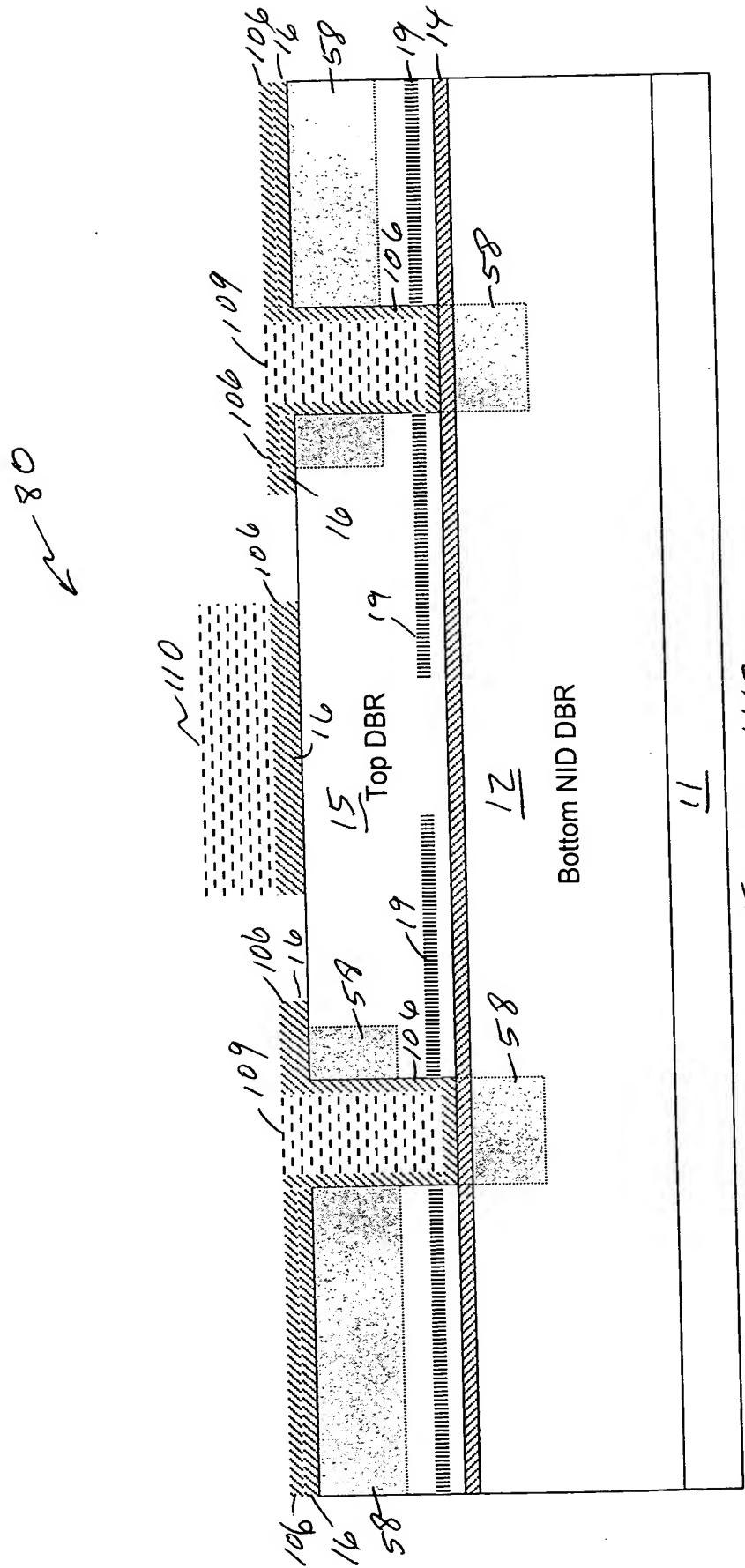


FIGURE 141



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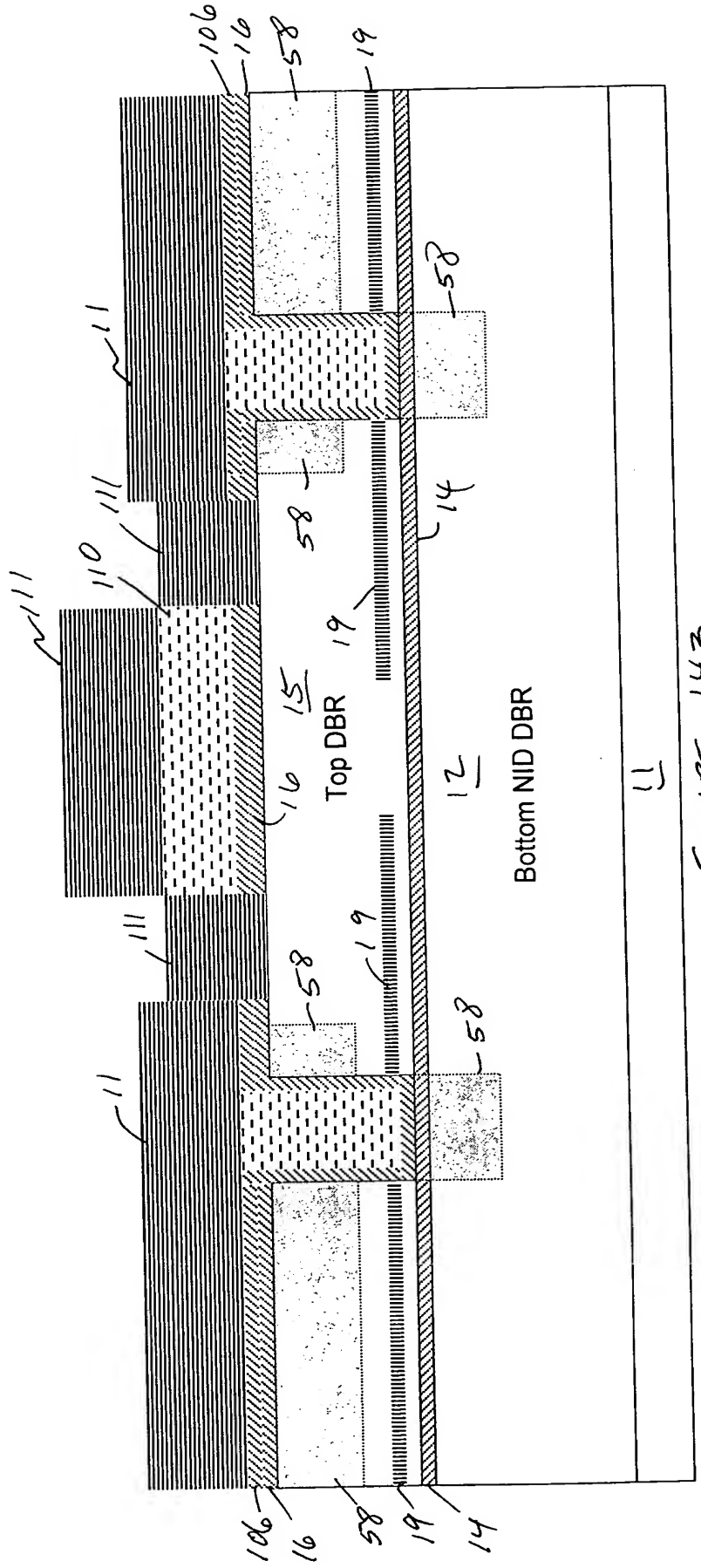
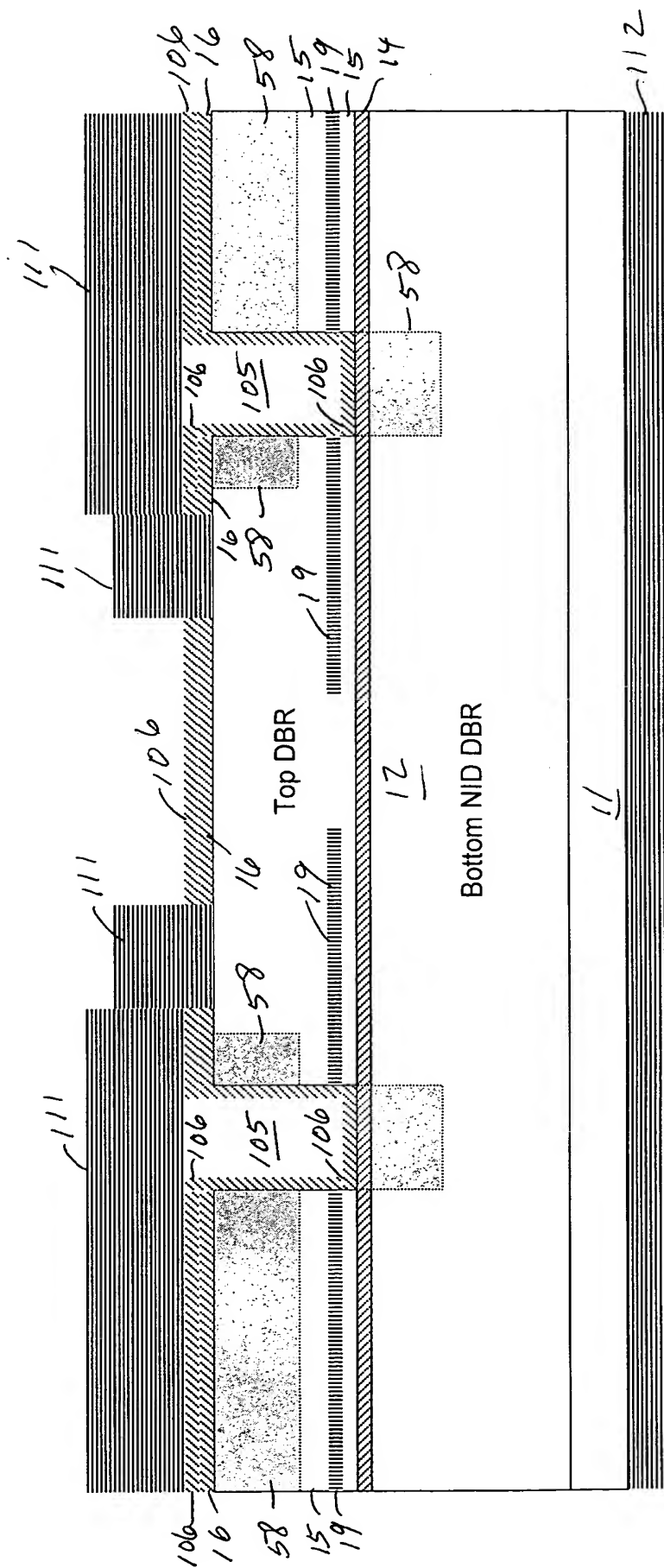


FIGURE 143

This diagram shows a cross-sectional view of a semiconductor device. It features a substrate 11 with a bottom NID DBR 12. Above this is a top DBR 15, which includes a layer 16 and a layer 105. The device also includes a layer 106 and a layer 111. Various other layers and structures are labeled with numbers 14, 19, 58, and 85.

Figure 144



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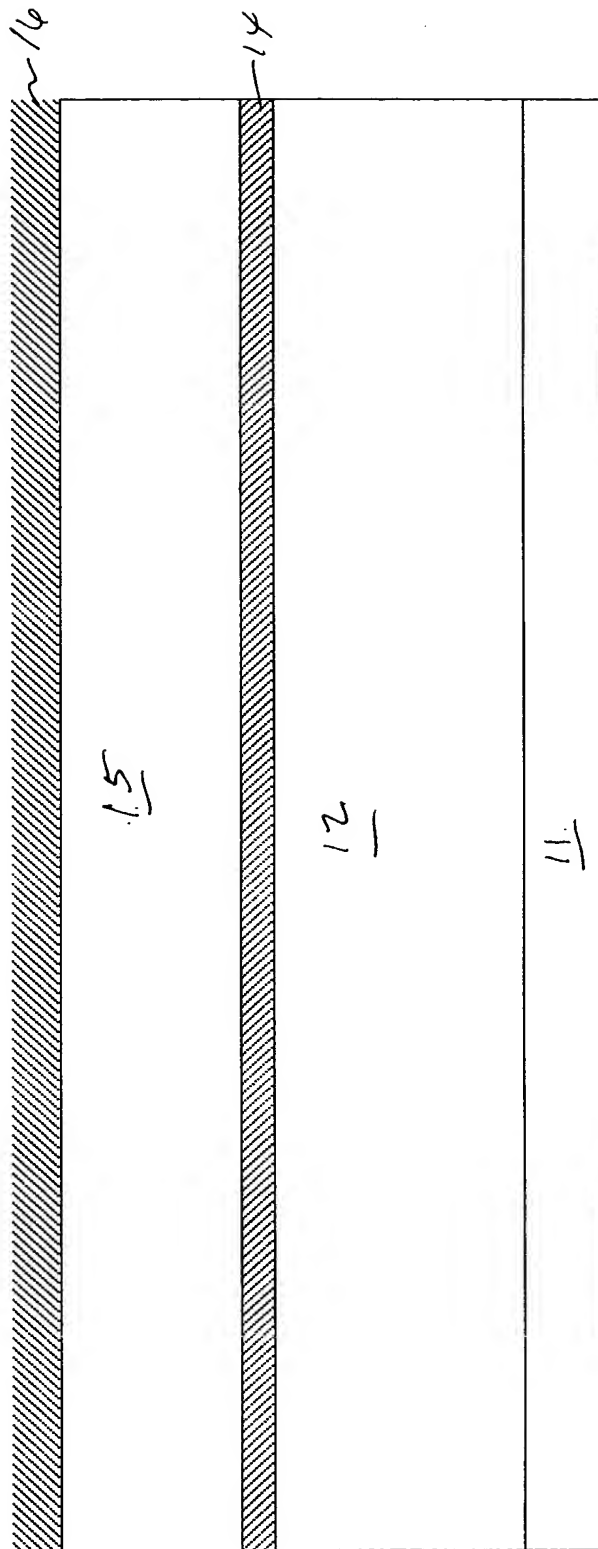


FIGURE 146

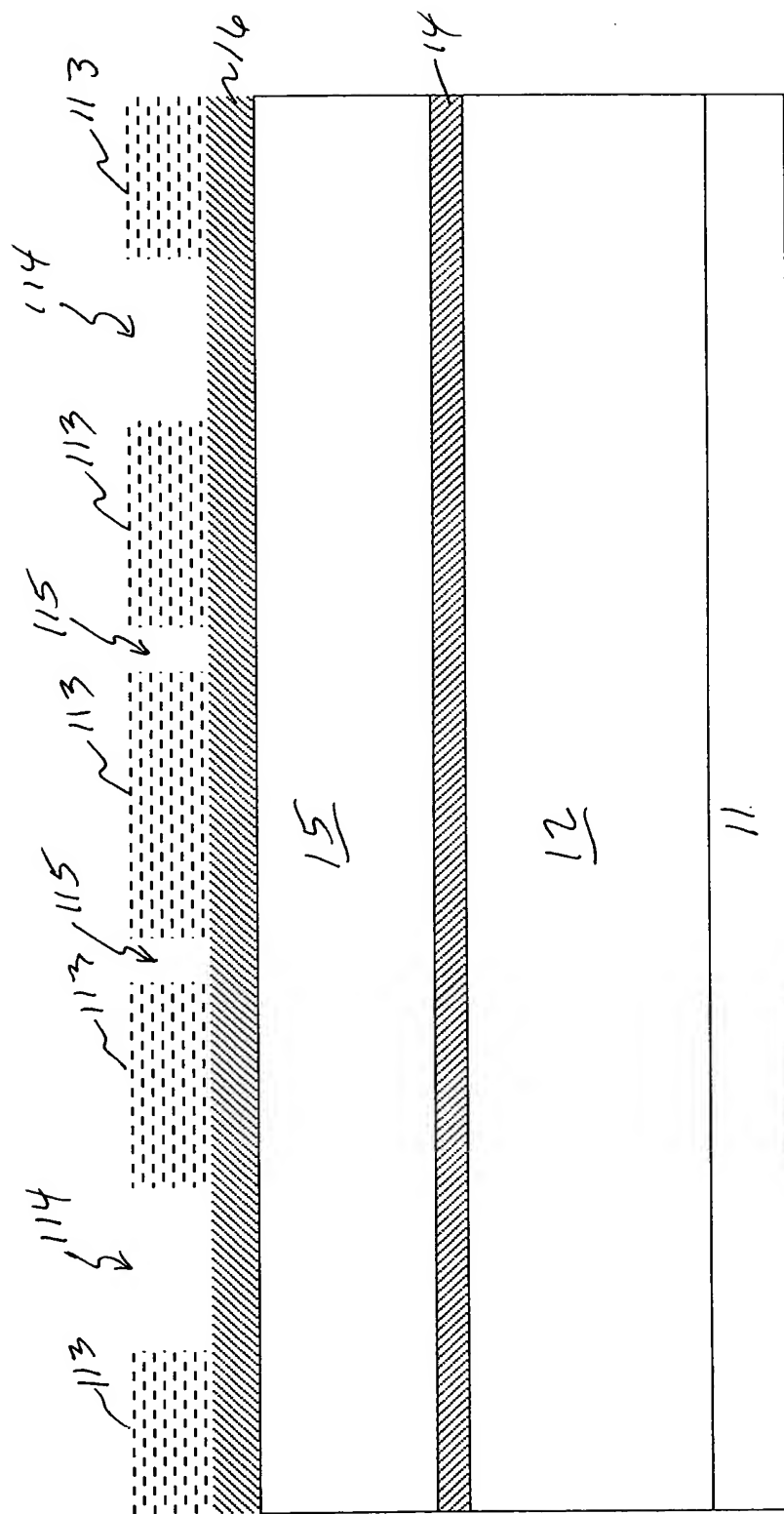


FIGURE 147

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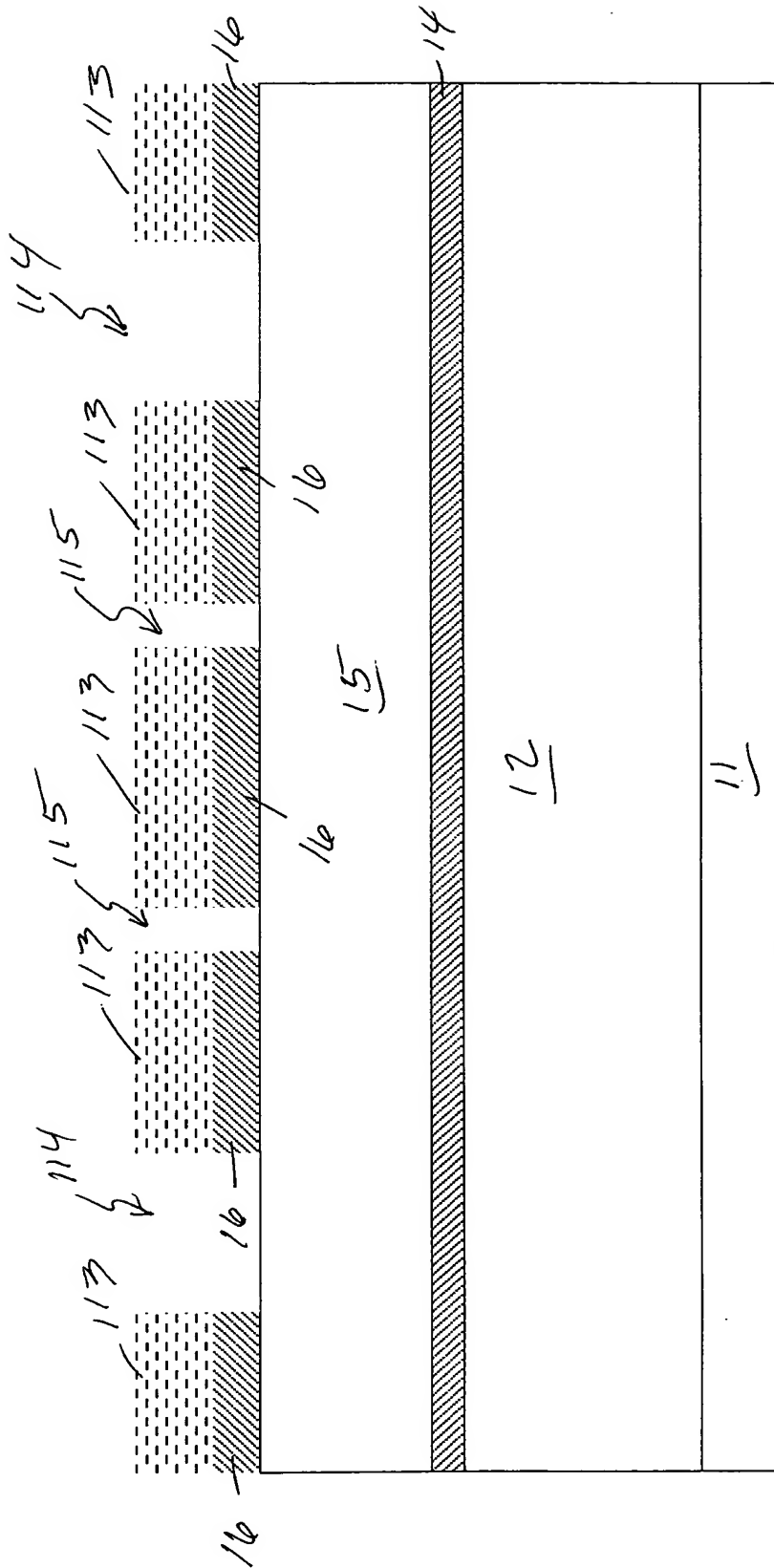


FIGURE 148

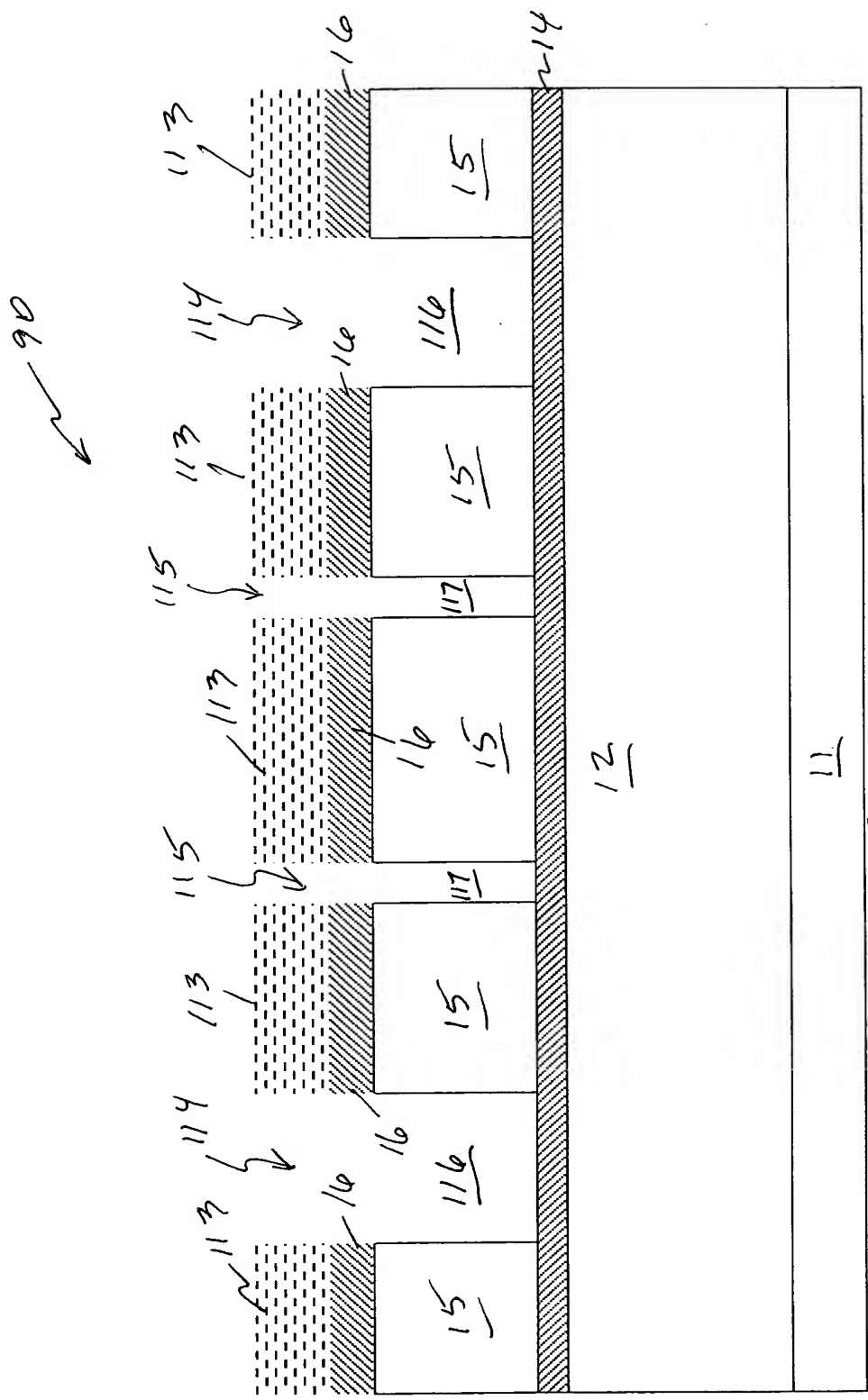


FIGURE 149

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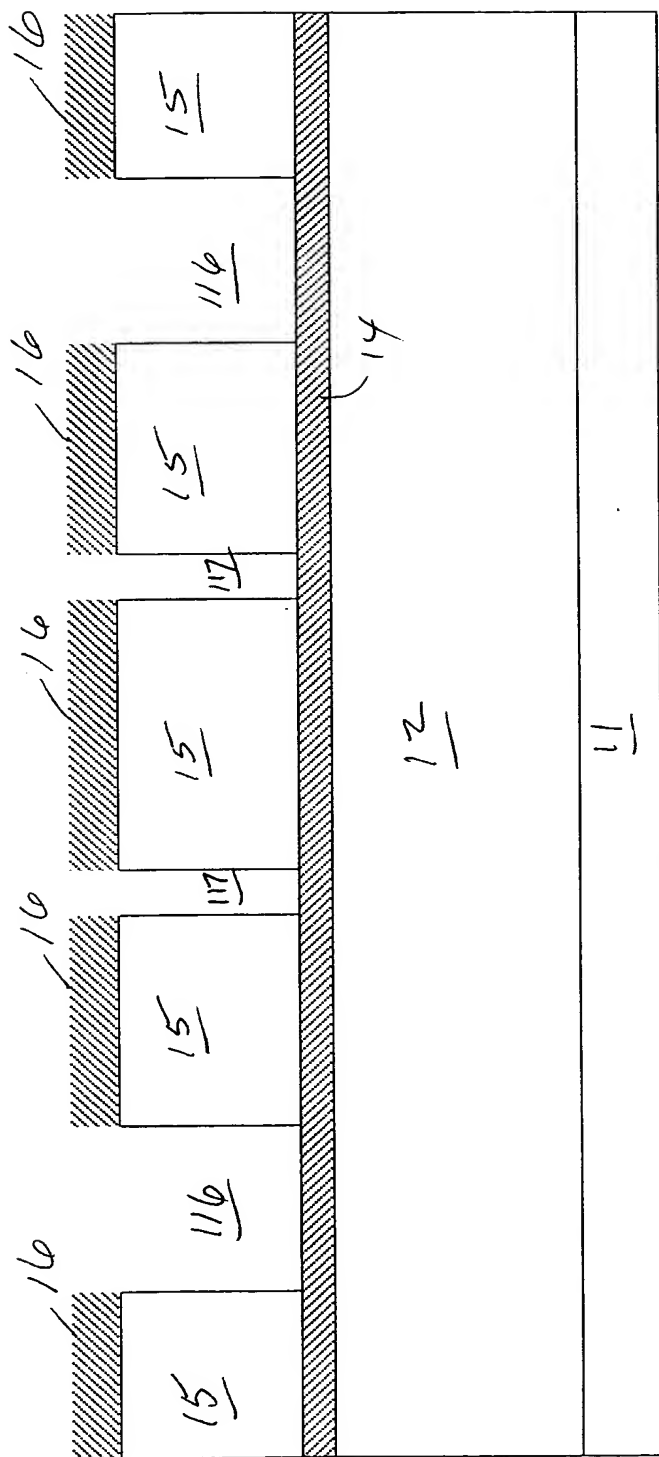


FIGURE 150

Hand-drawn diagram of a multi-story building with five floors. Each floor has a rectangular room with a hatched area on the left. The rooms are labeled with numbers and have small rectangular features. The building is labeled with '16' on the left, '14' on the right, and '12' in the center. The floor is labeled '11' at the bottom.

Labels on the left side of the building: 16, 16, 16, 16, 16.

Labels on the right side of the building: 14.

Label in the center of the building: 12.

Label at the bottom of the building: 11.

Labels inside the rooms (from top to bottom):

- Room 1: 15, 118, 116
- Room 2: 15, 119, 118, 116
- Room 3: 15, 119, 117, 119
- Room 4: 15, 118, 119, 117, 116
- Room 5: 15, 118, 116

FIGURE 151

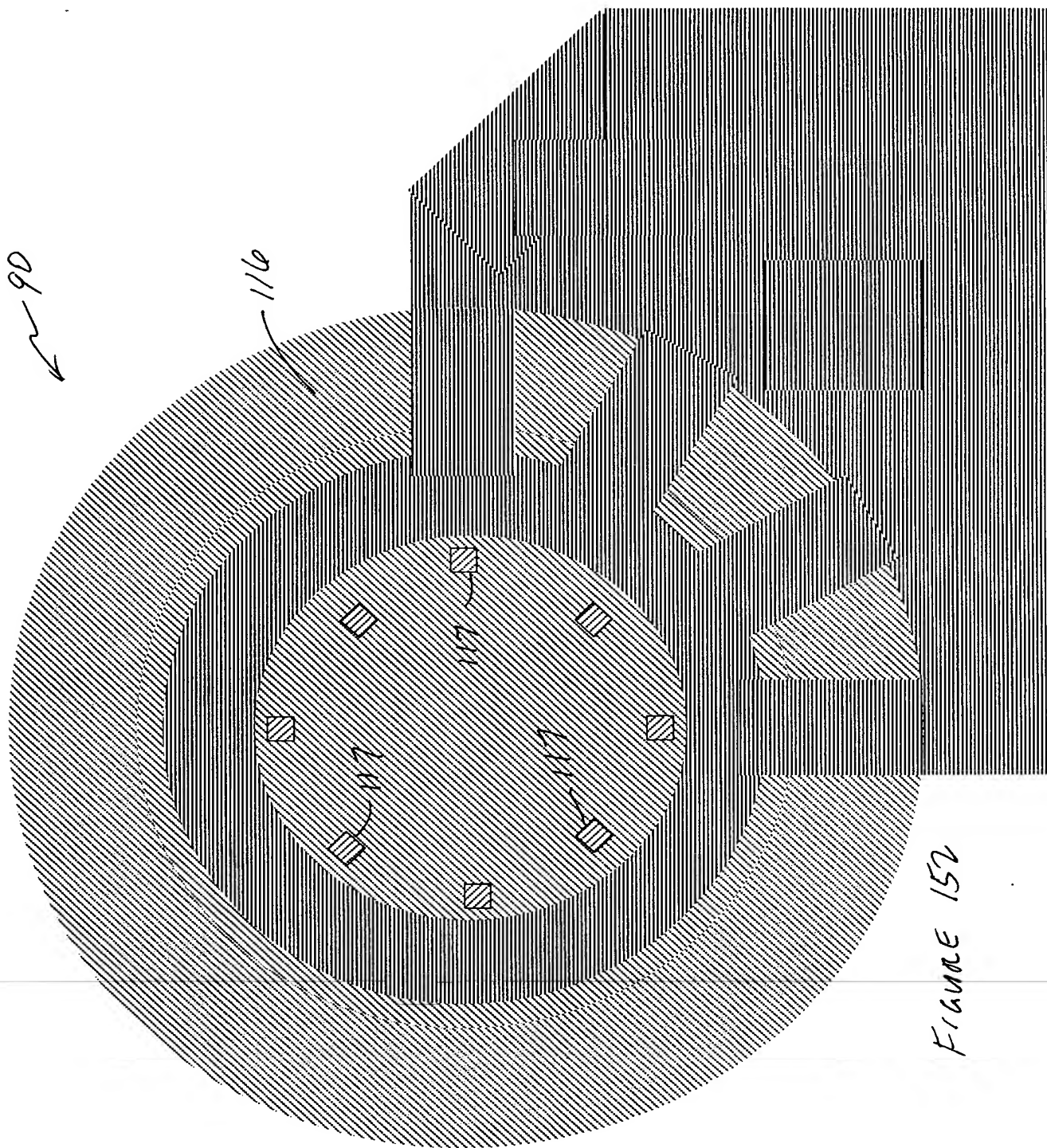
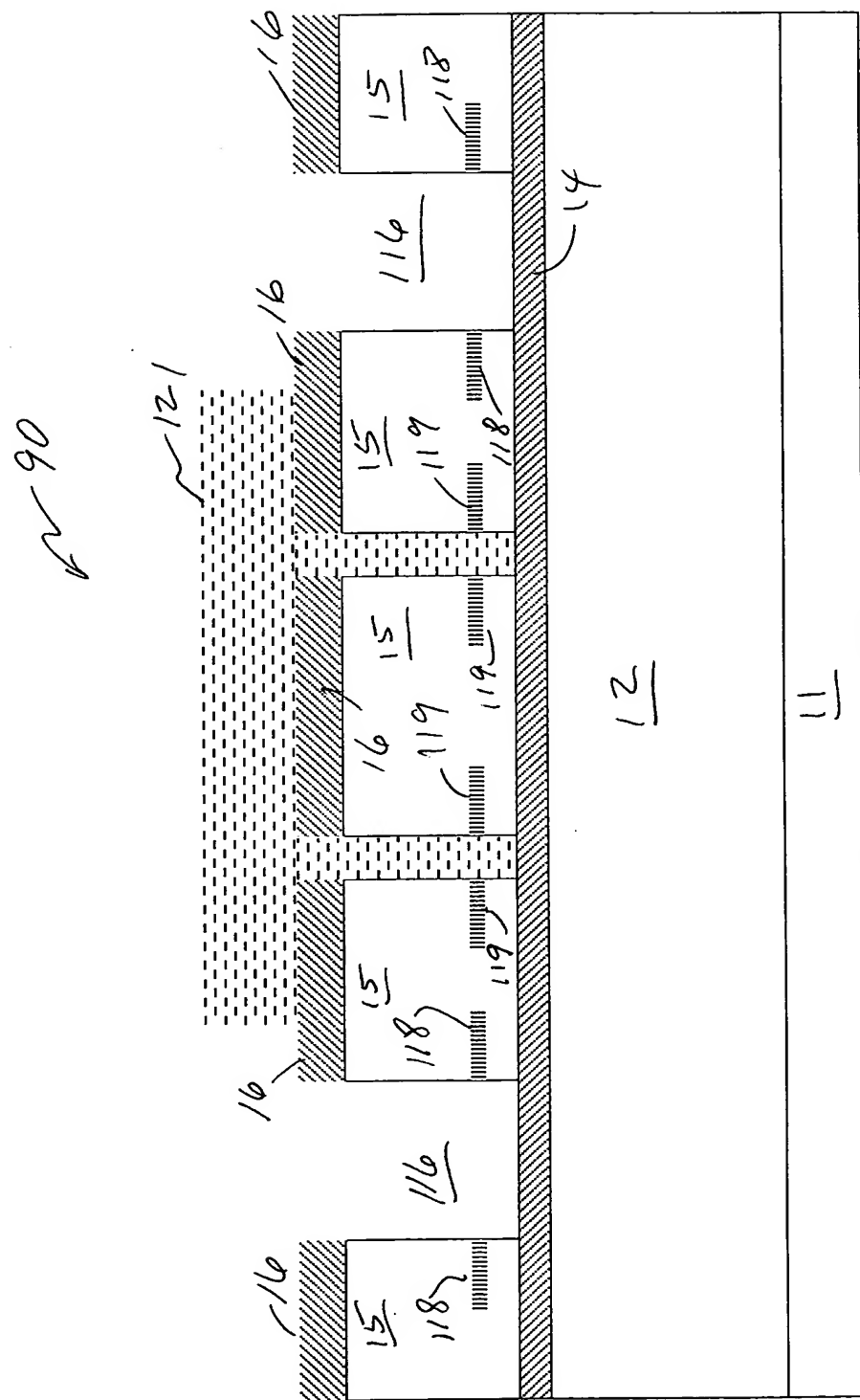
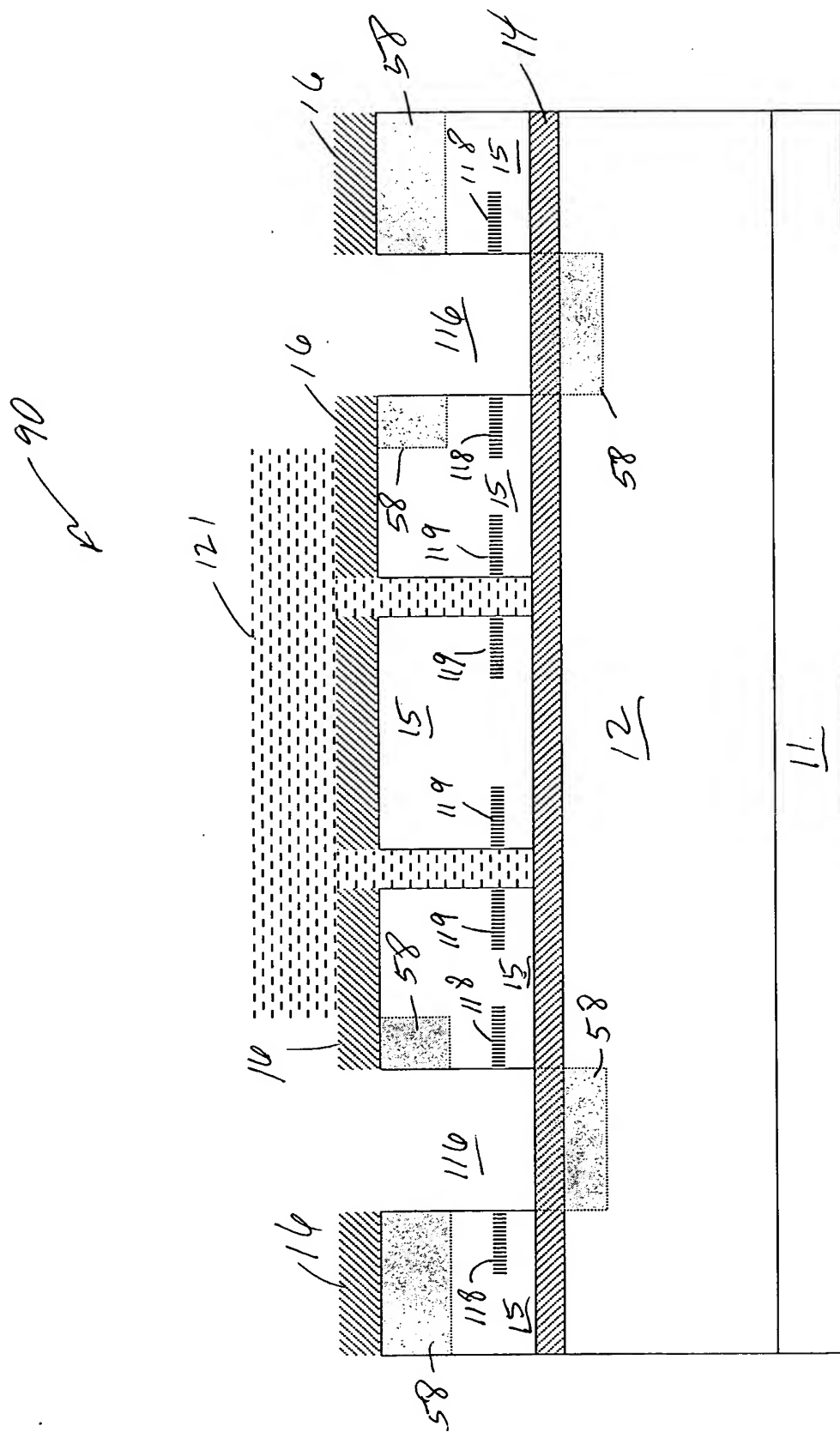


FIGURE 152





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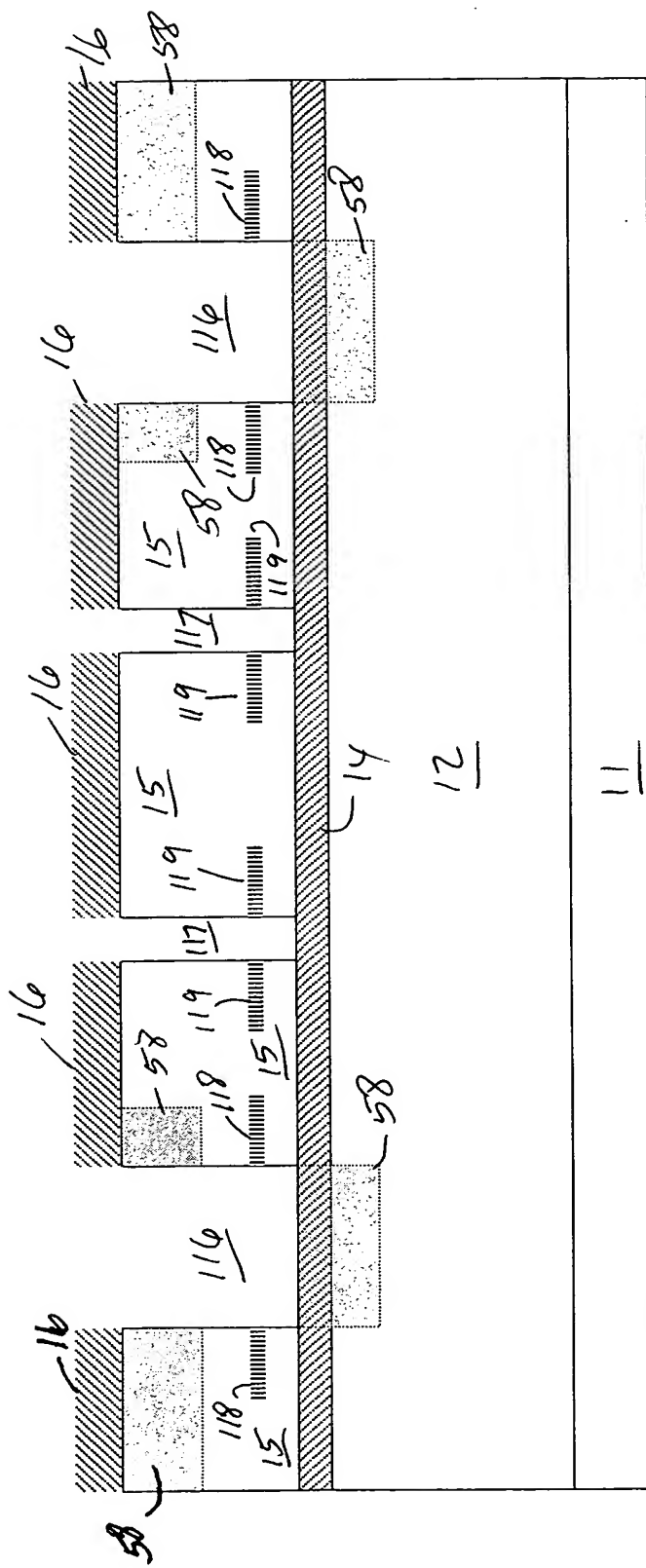


FIGURE 155

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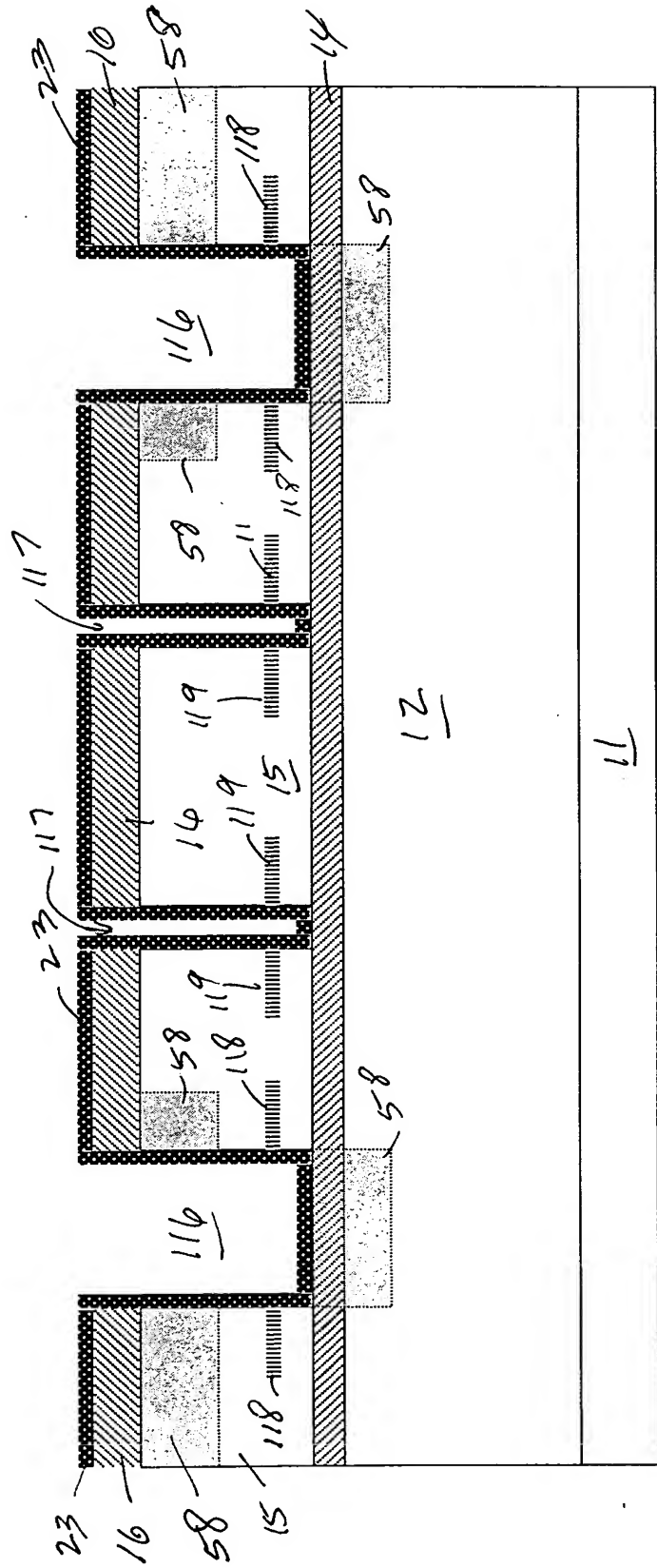


FIGURE 156

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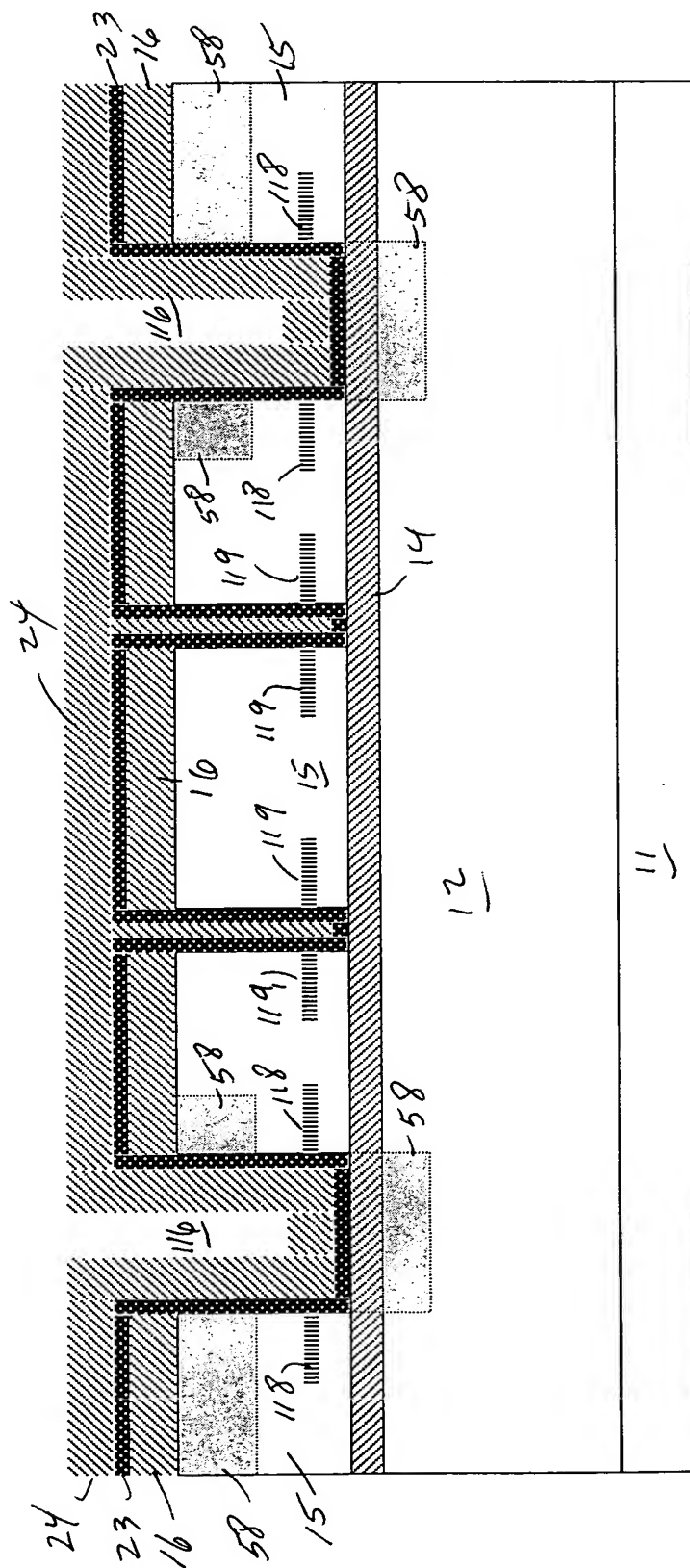
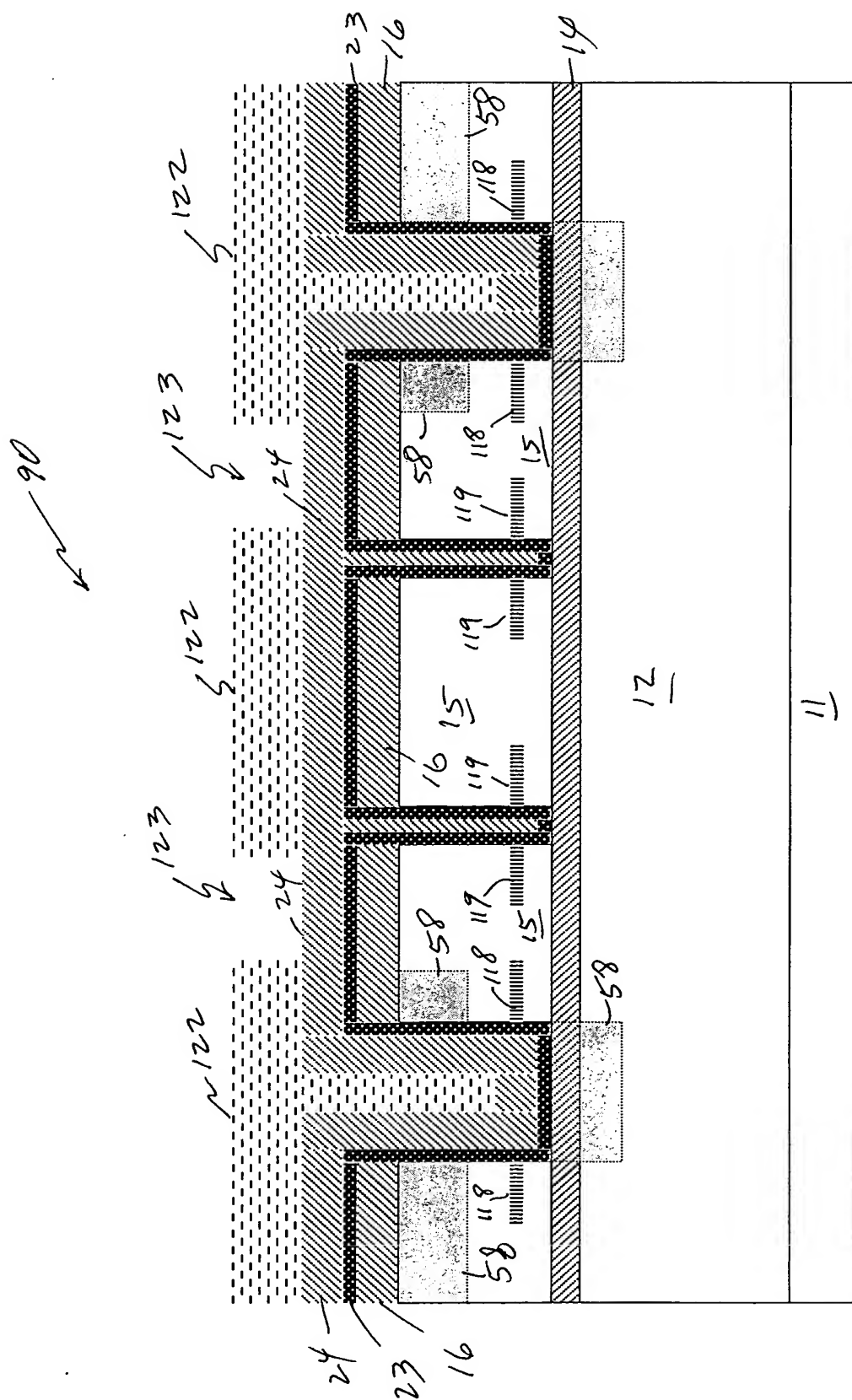


FIGURE 157



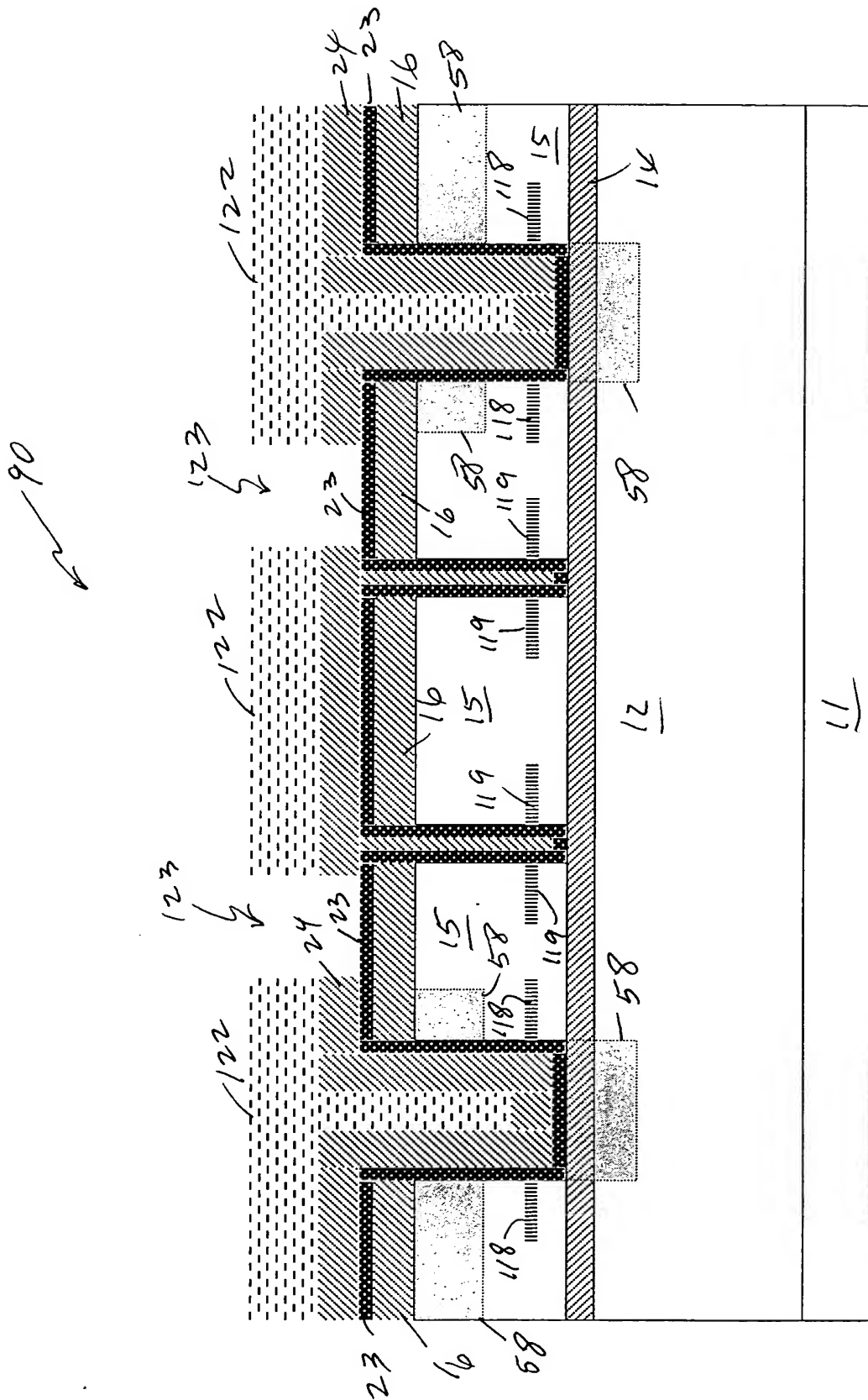
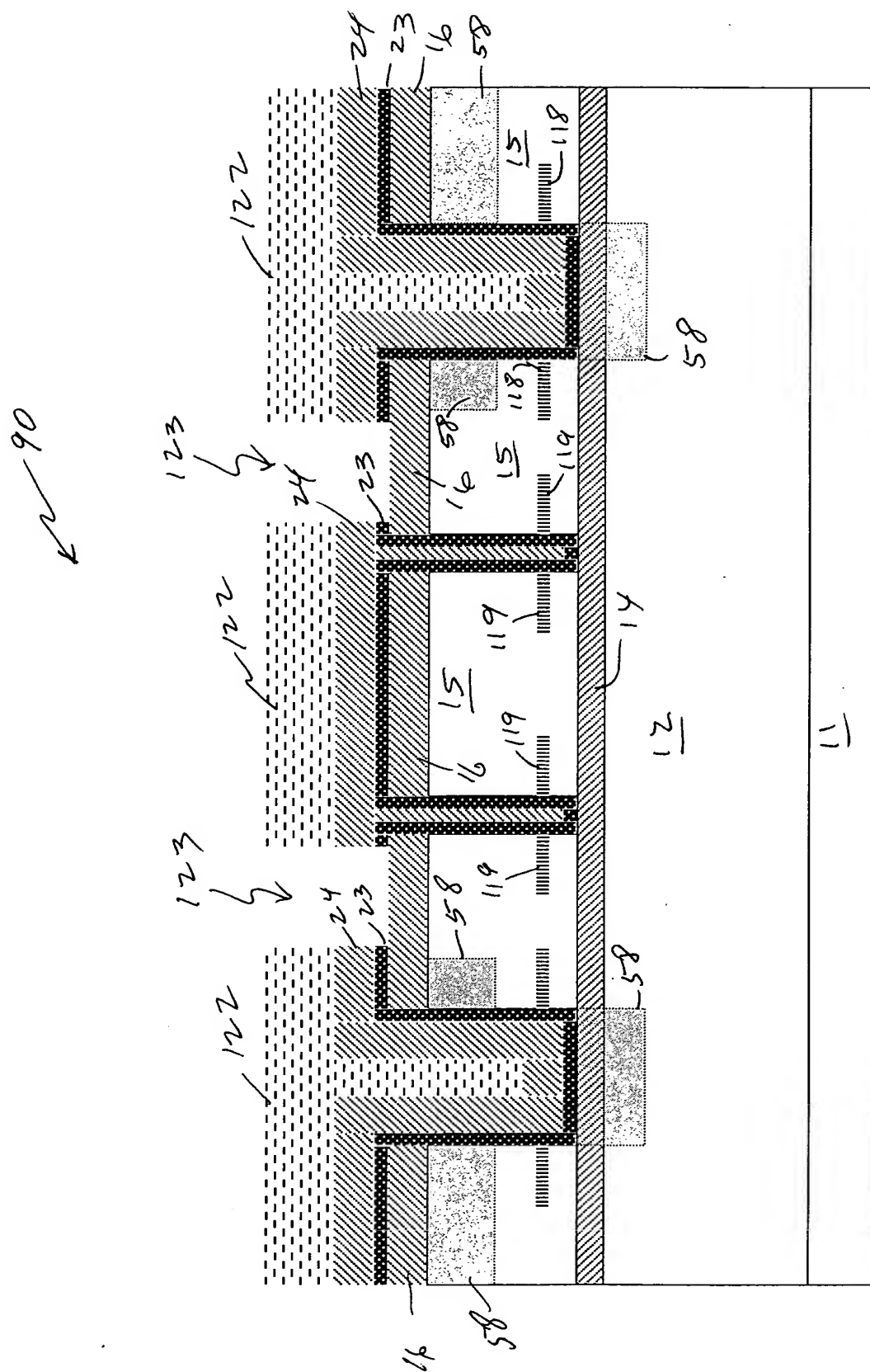


FIGURE 159



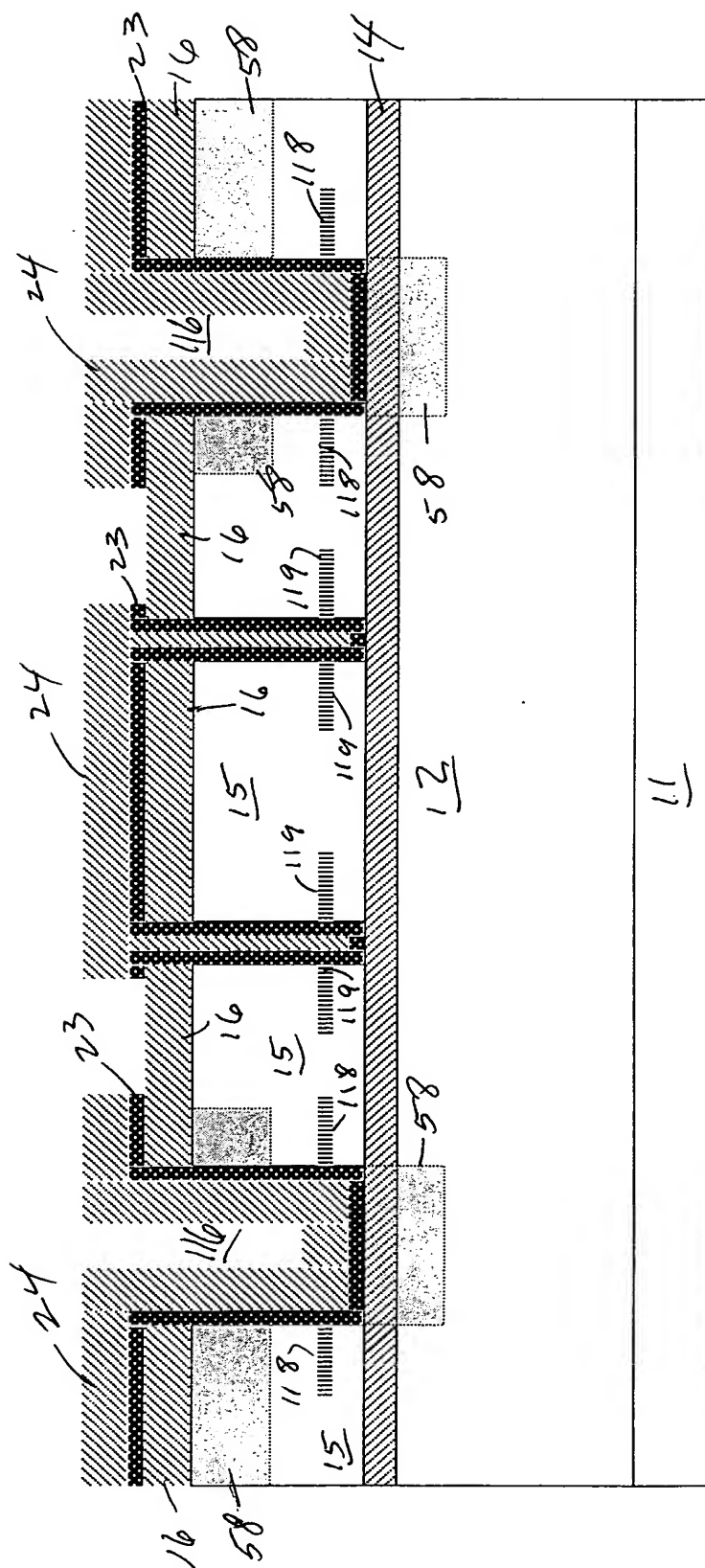


FIGURE 161

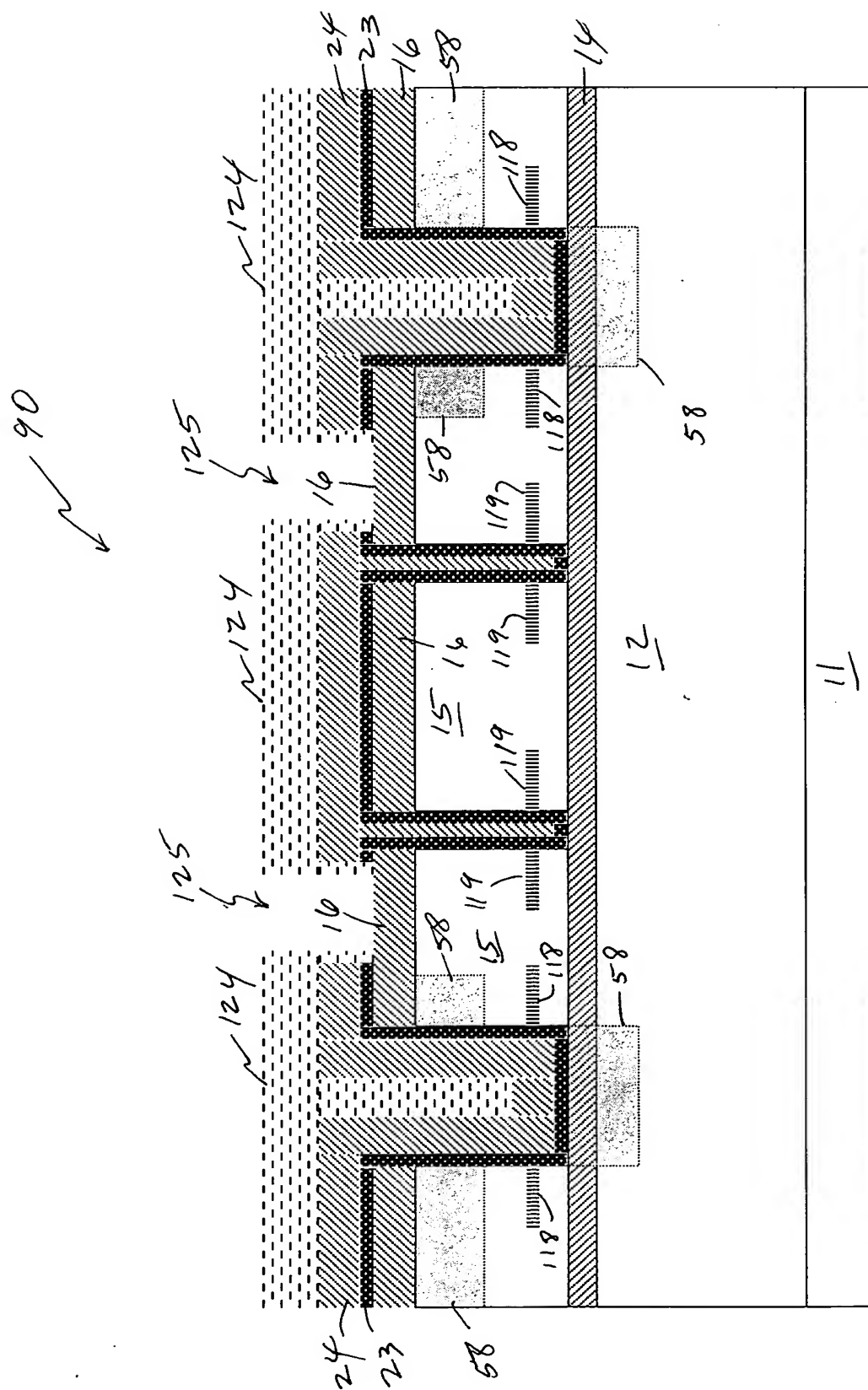
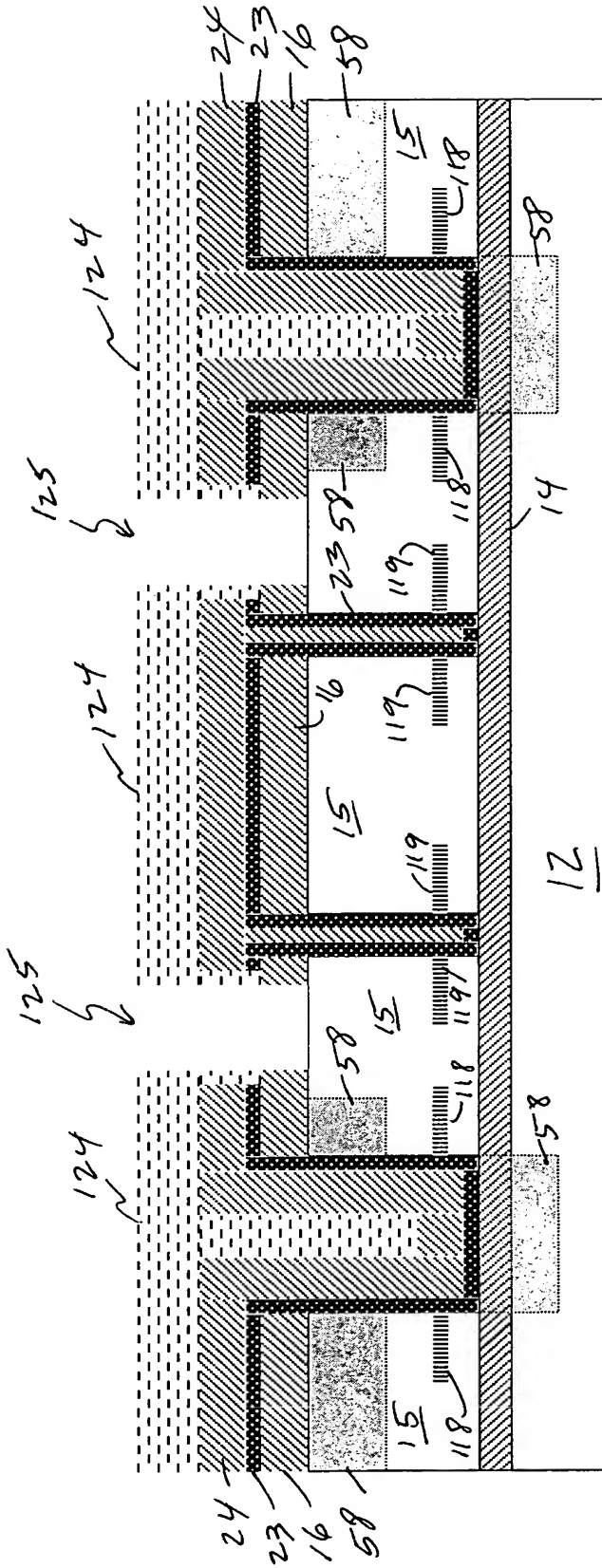


FIGURE 162

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FIGURE 163

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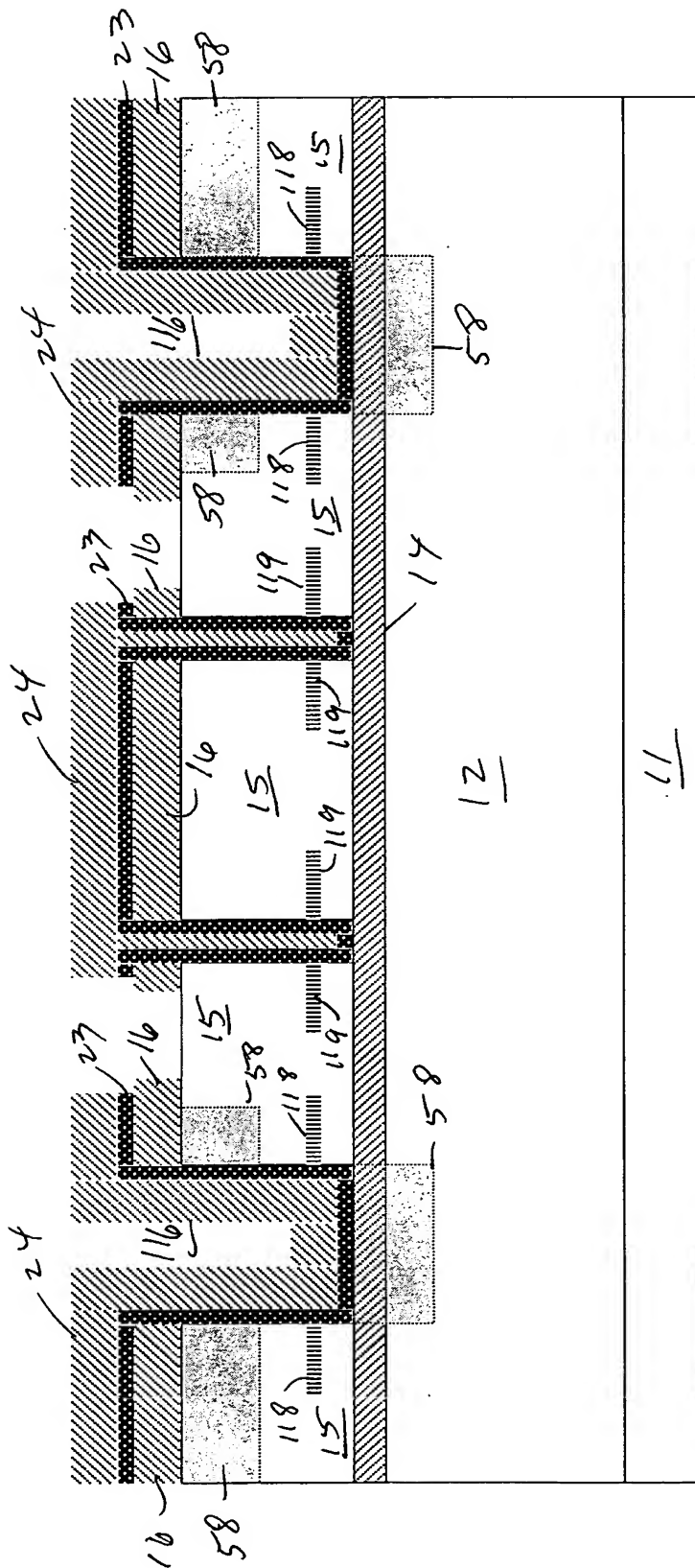
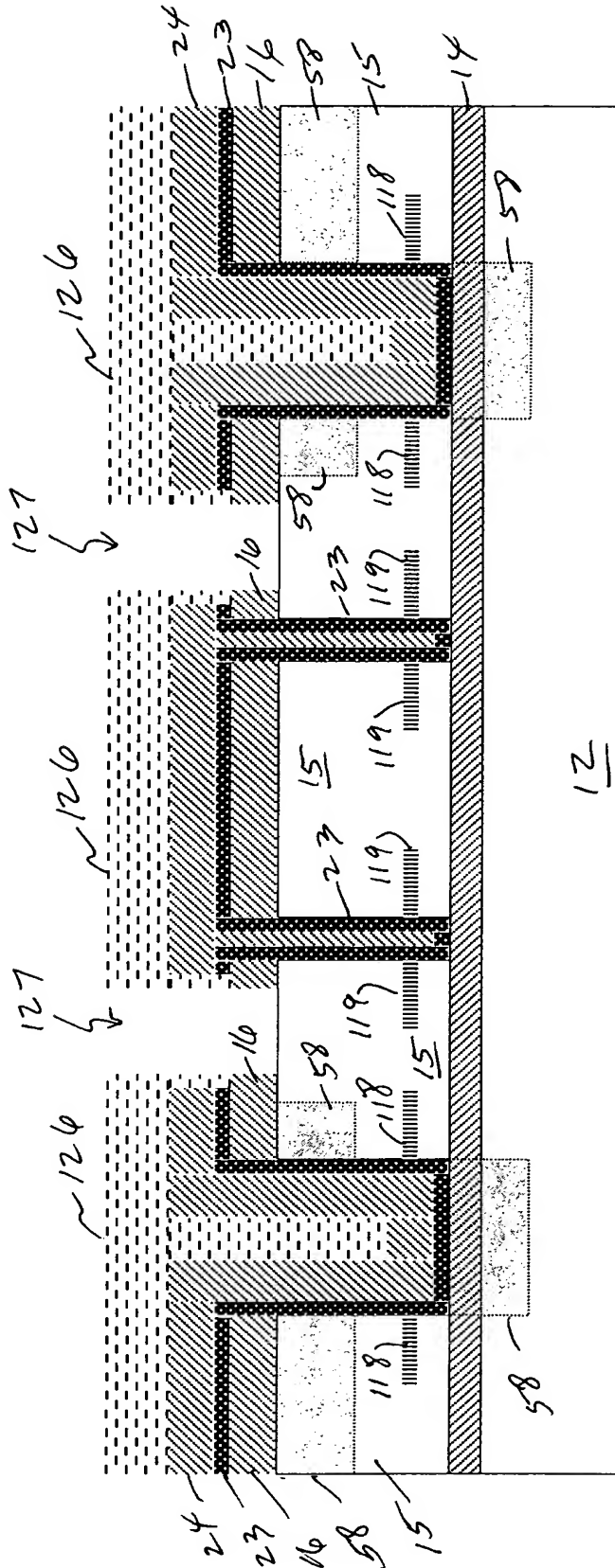


FIGURE 104

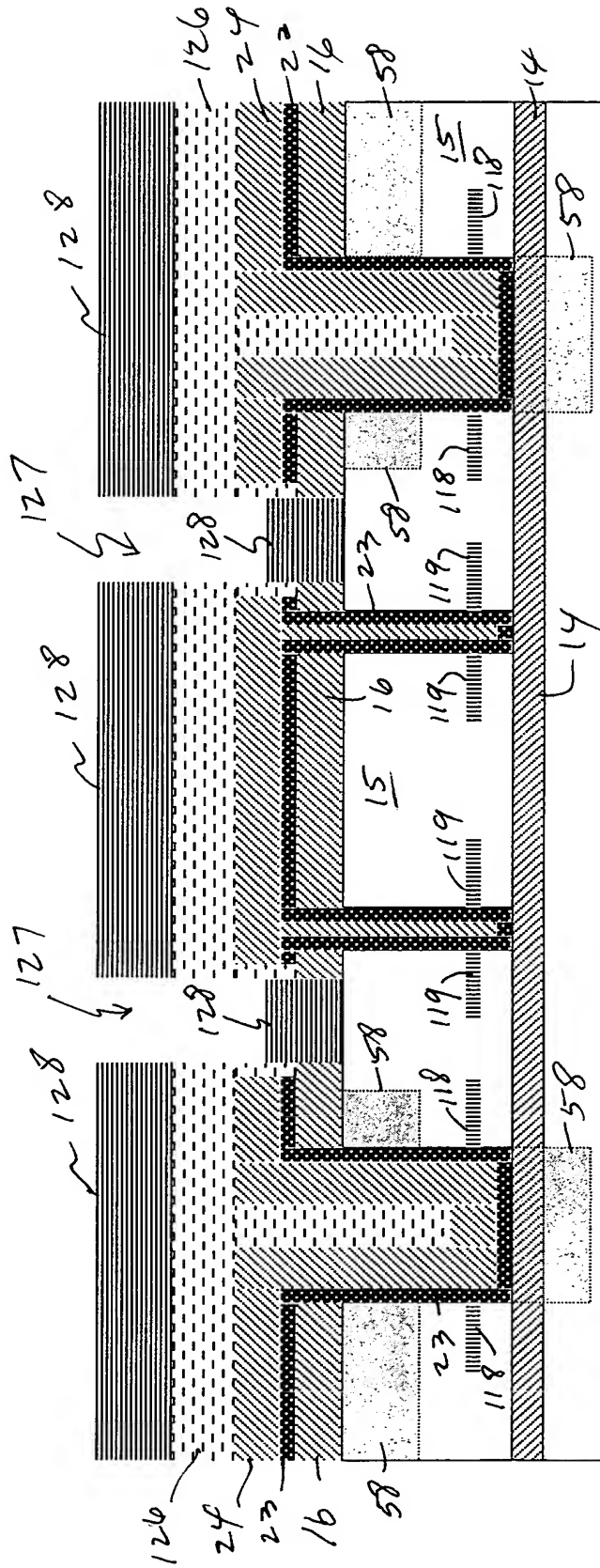
90



11

FIGURE 165

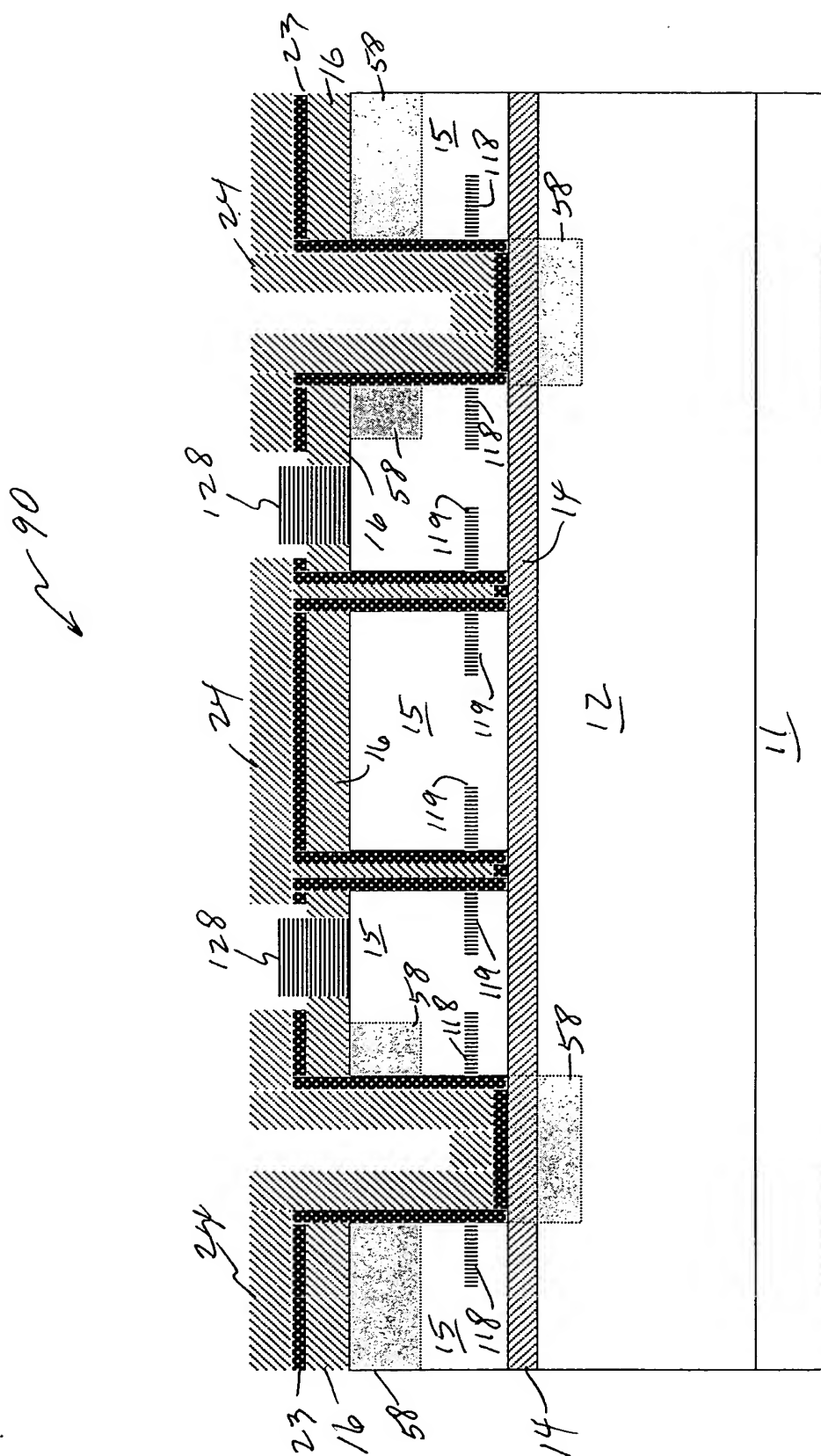
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12

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FIGURE 166



90

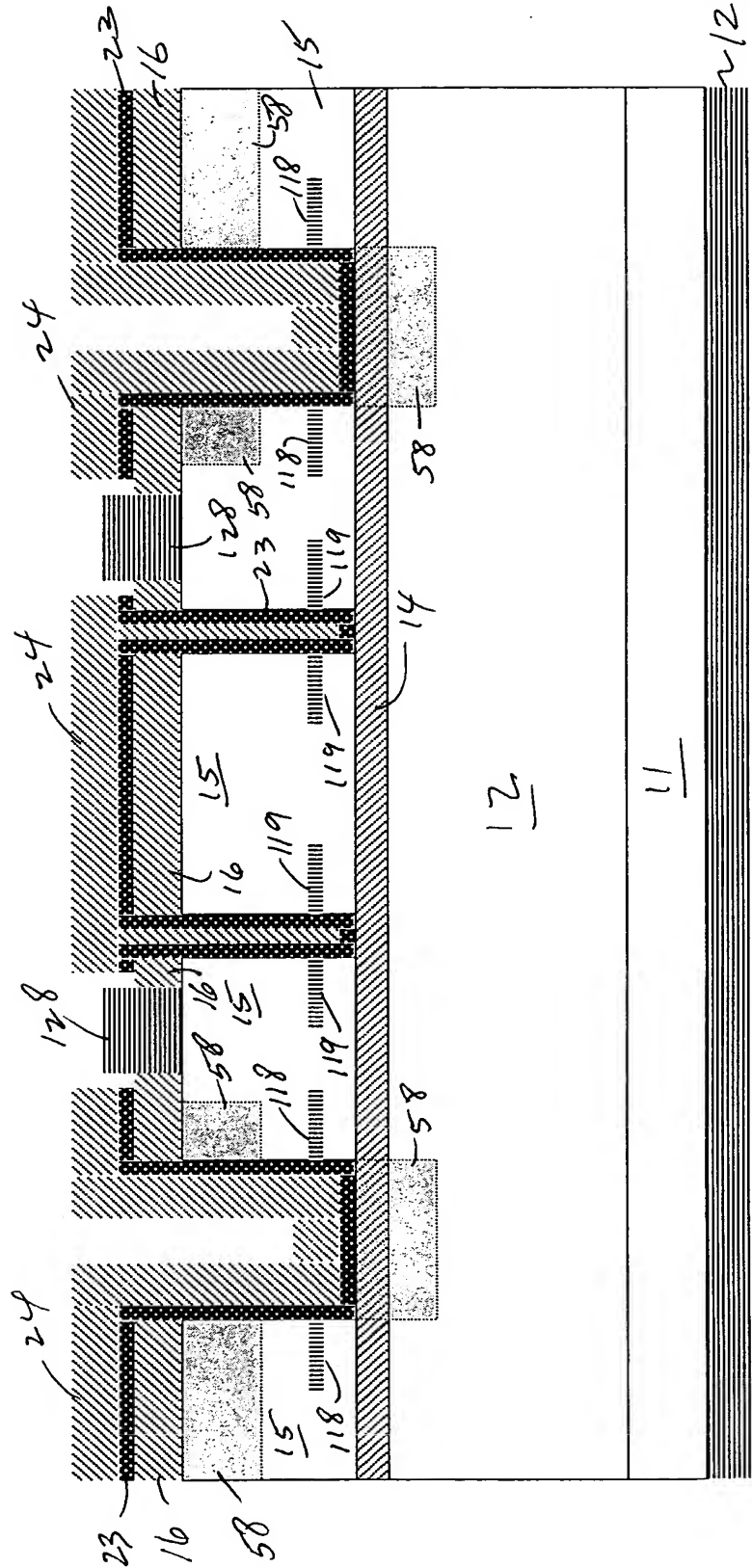


FIGURE 168

100 ↗

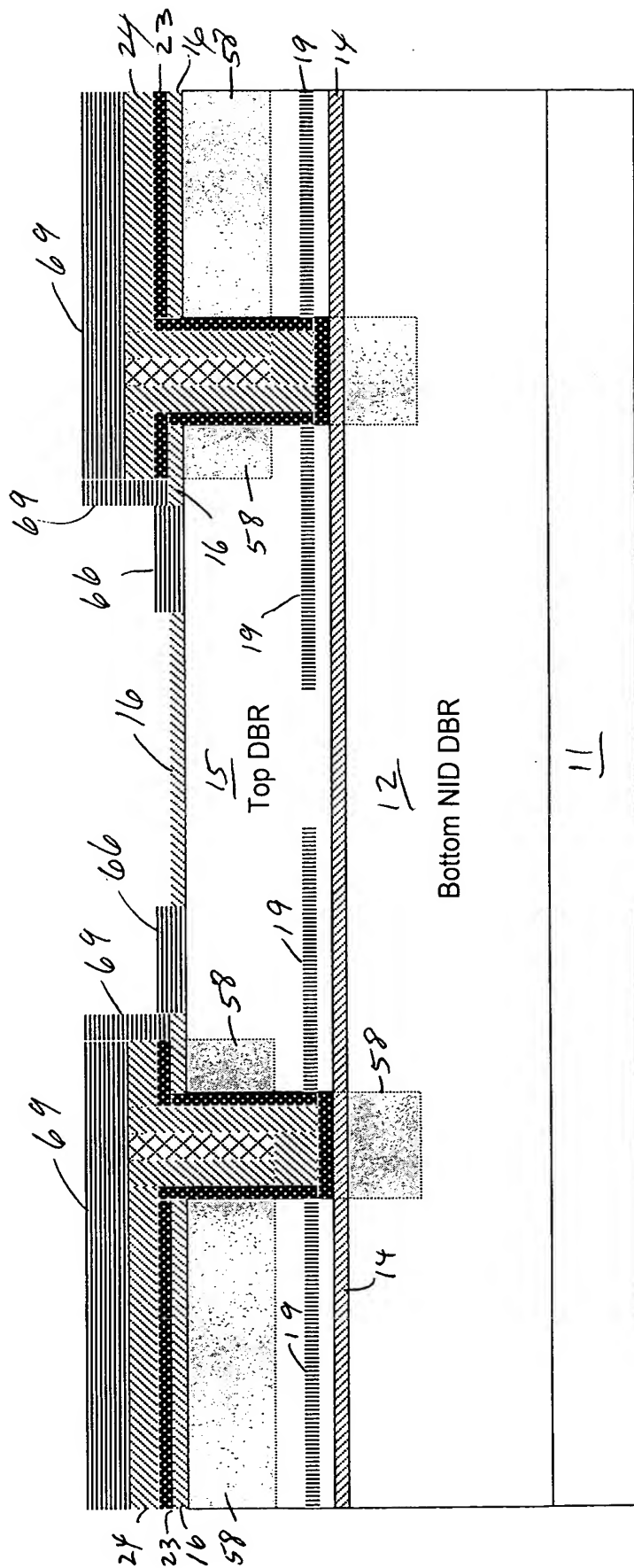


FIGURE 169

100

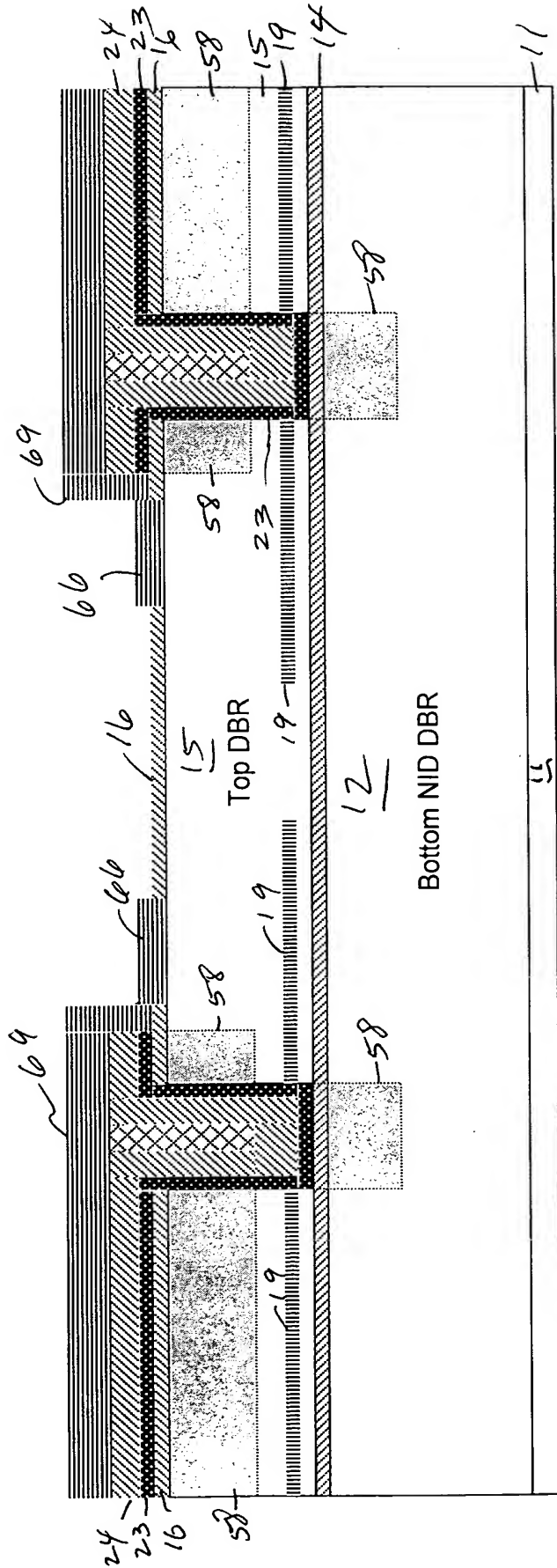


FIGURE 170

100

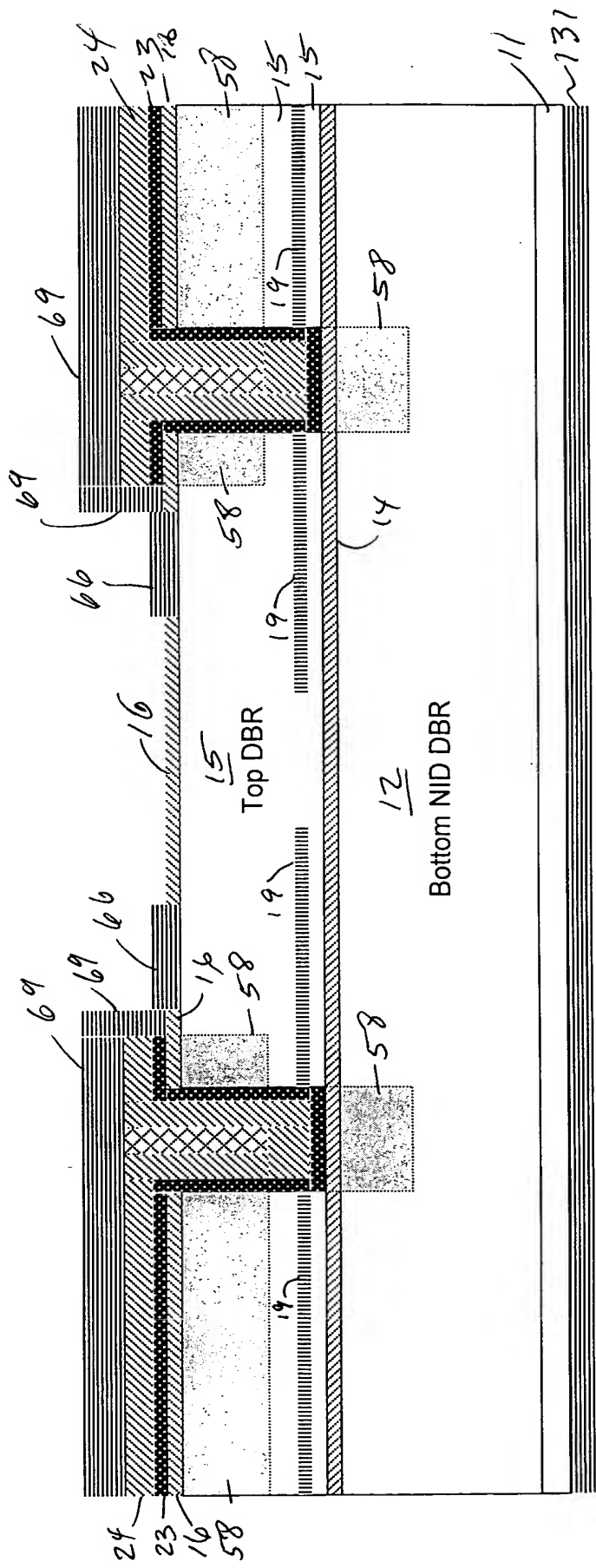


FIGURE 171

110

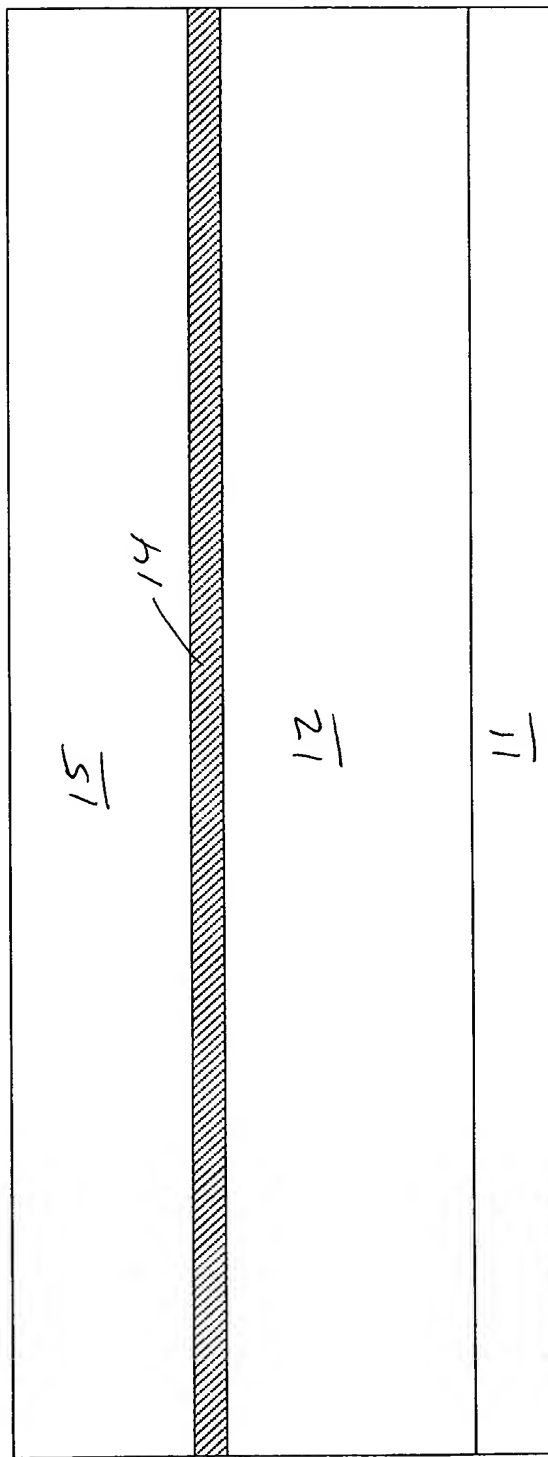


FIGURE 172

110

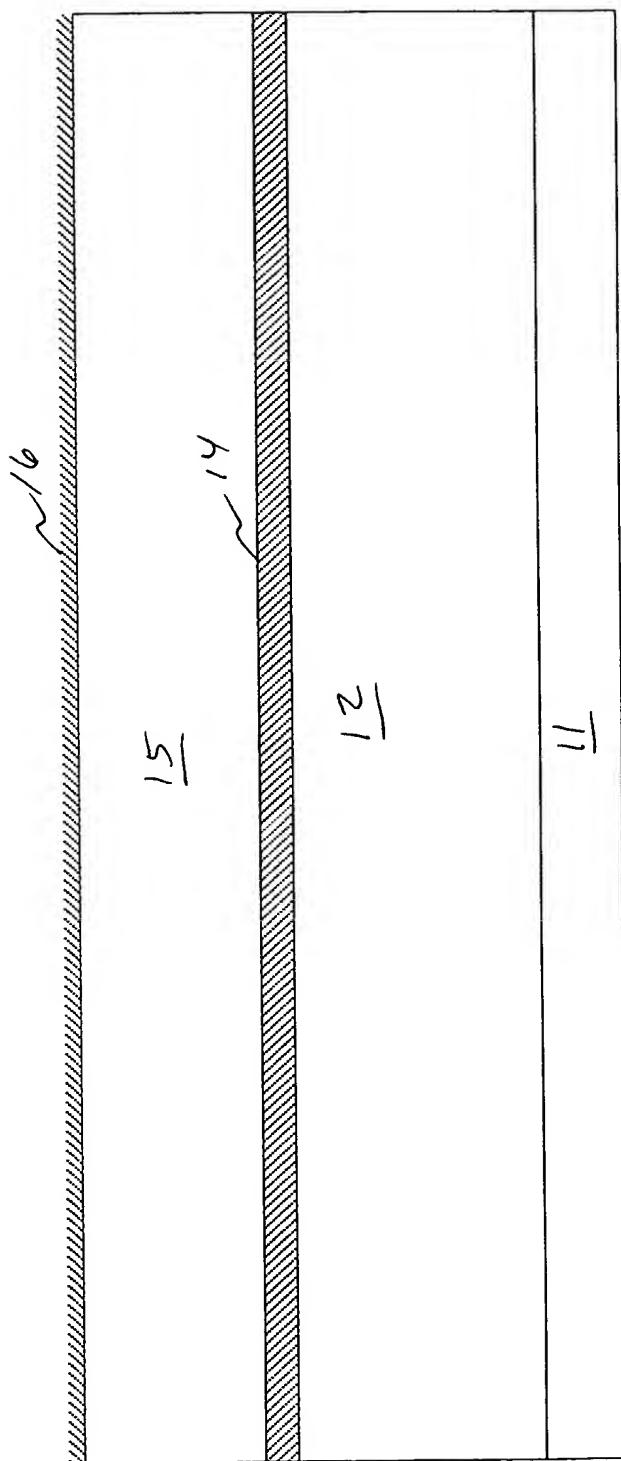


FIGURE 173

110

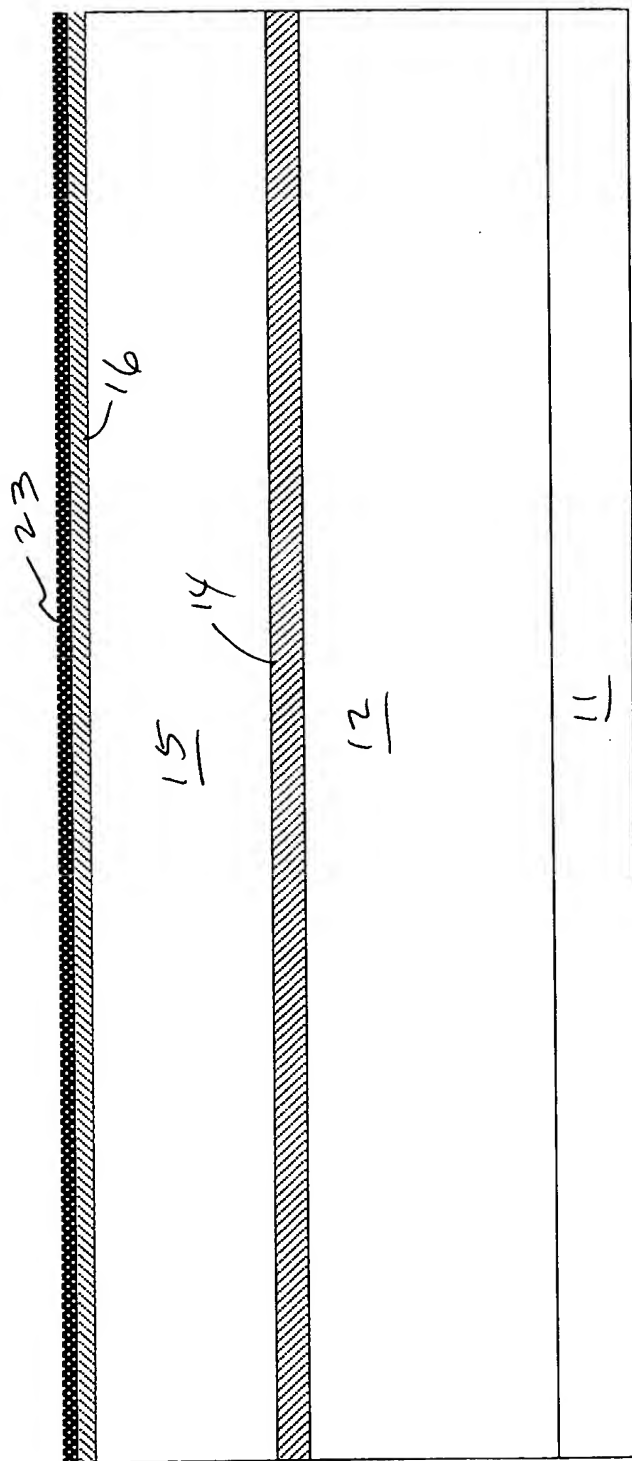


FIGURE 174

110

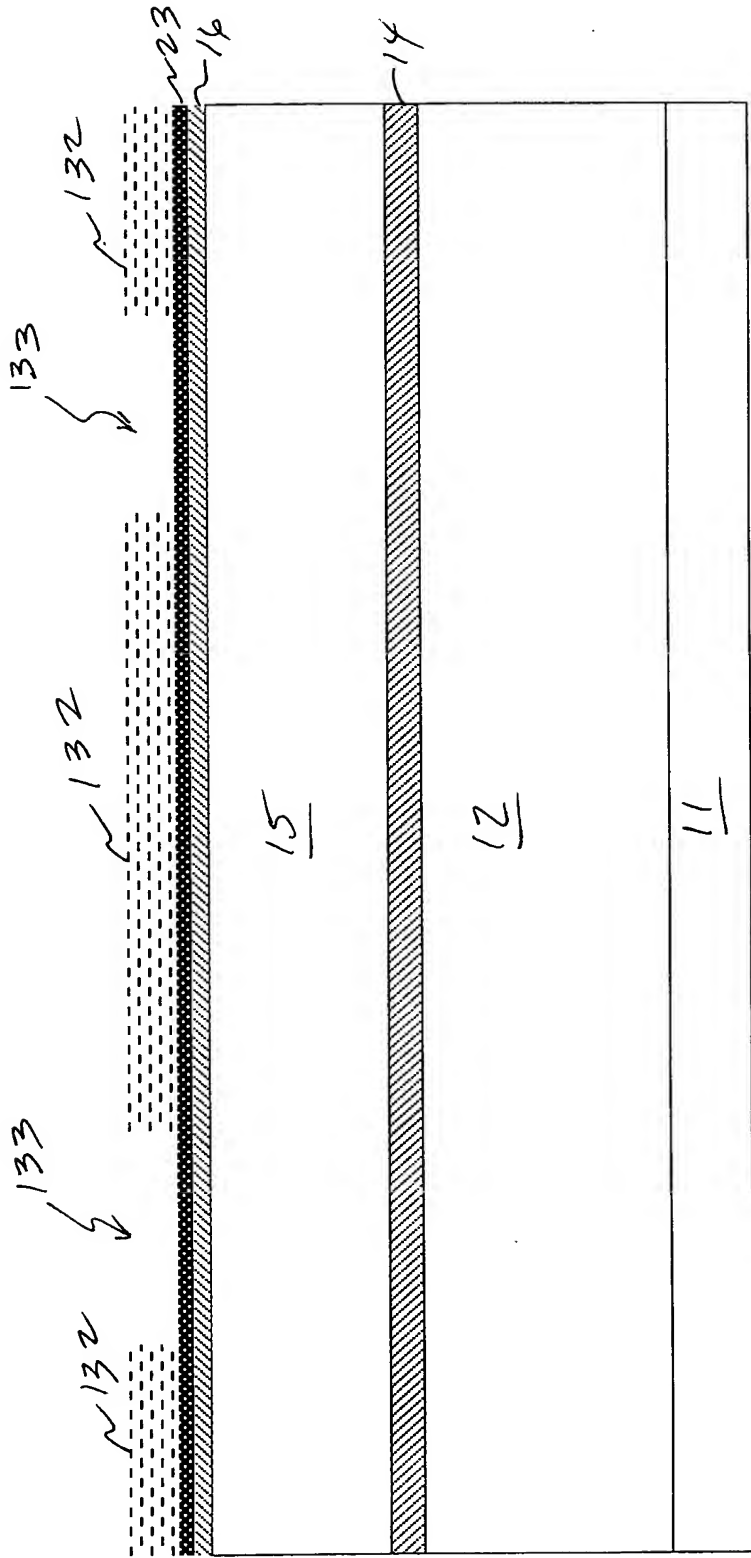


FIGURE 175

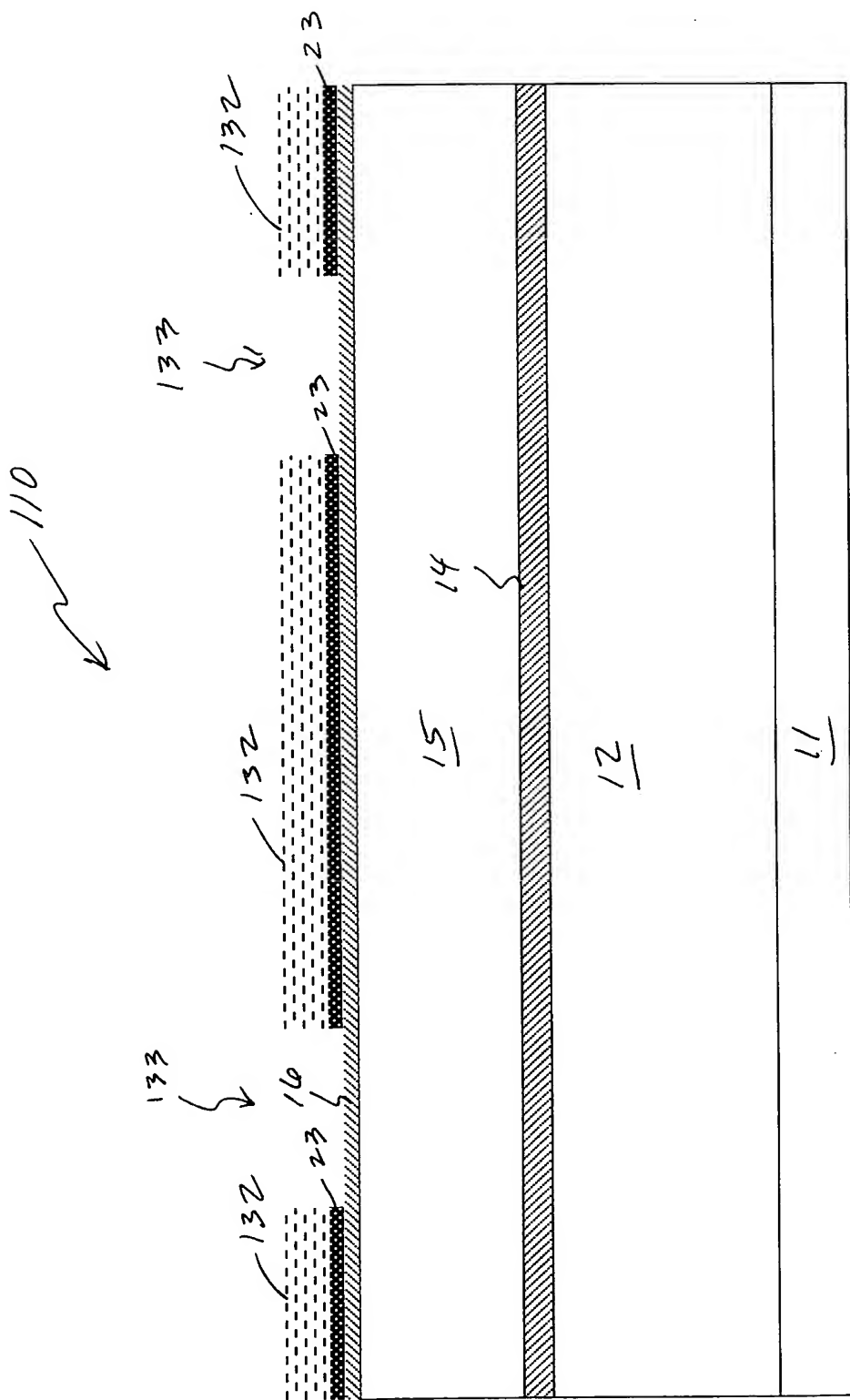


FIGURE 176

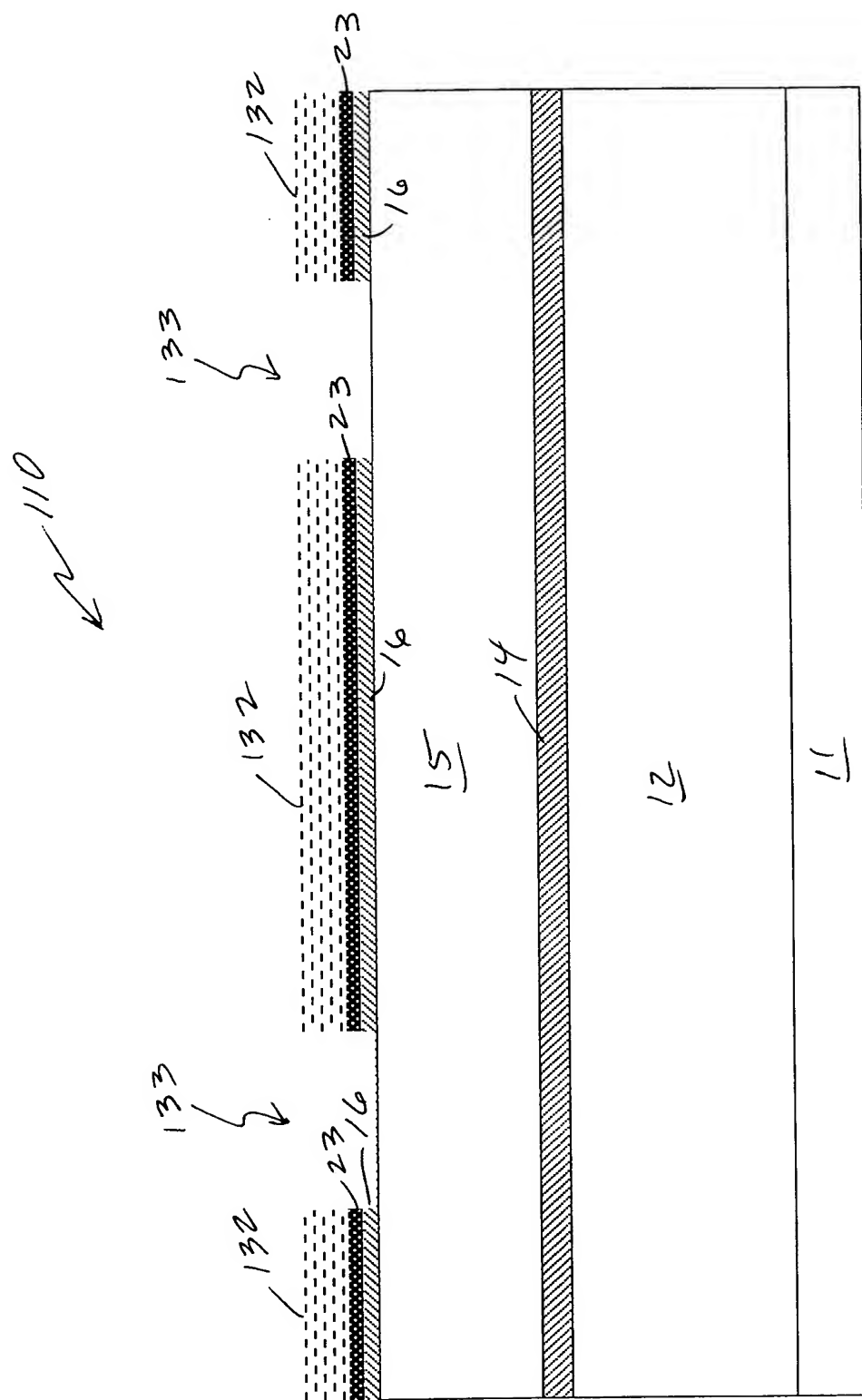


FIGURE 177

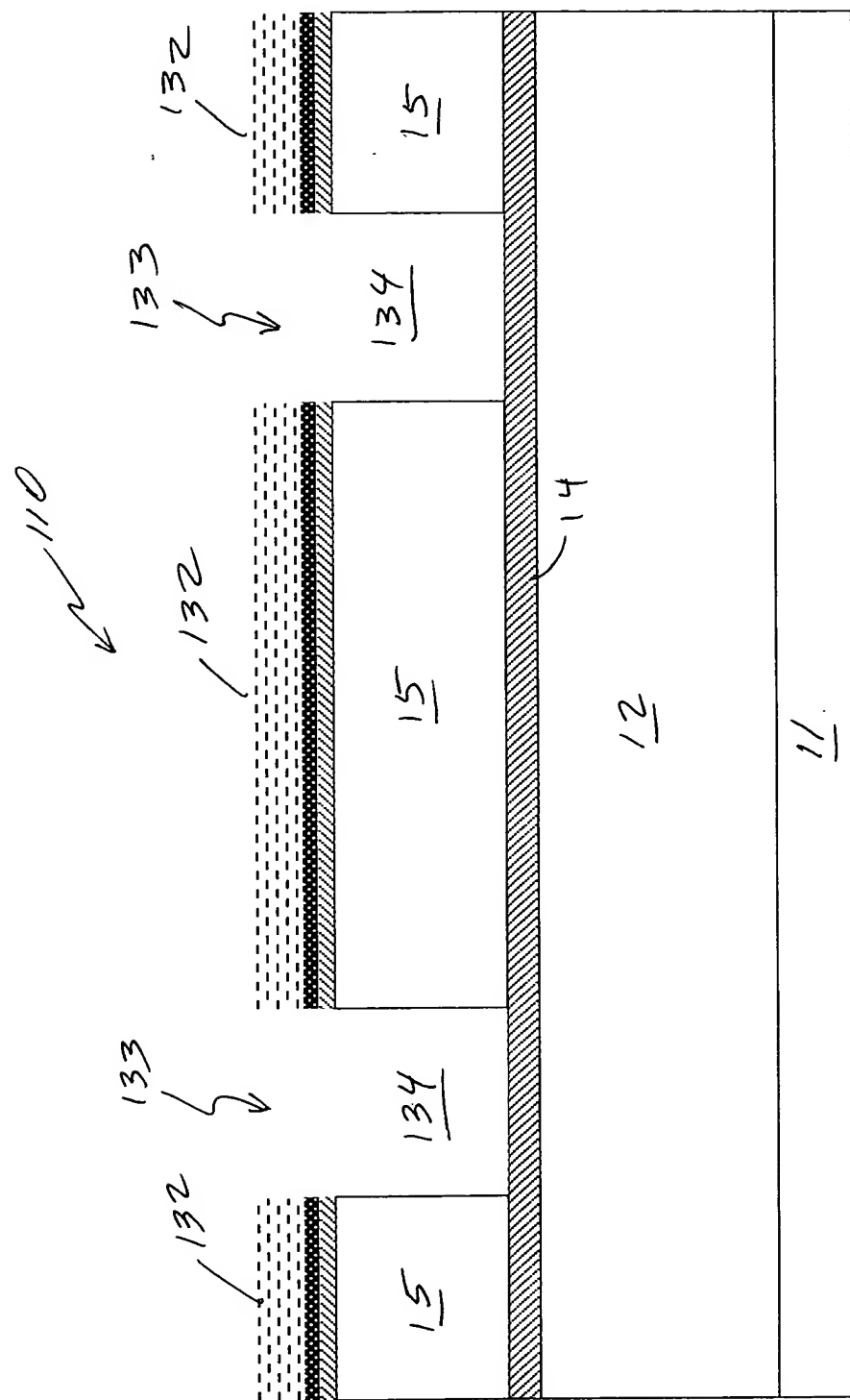


FIGURE 178

110 ↗

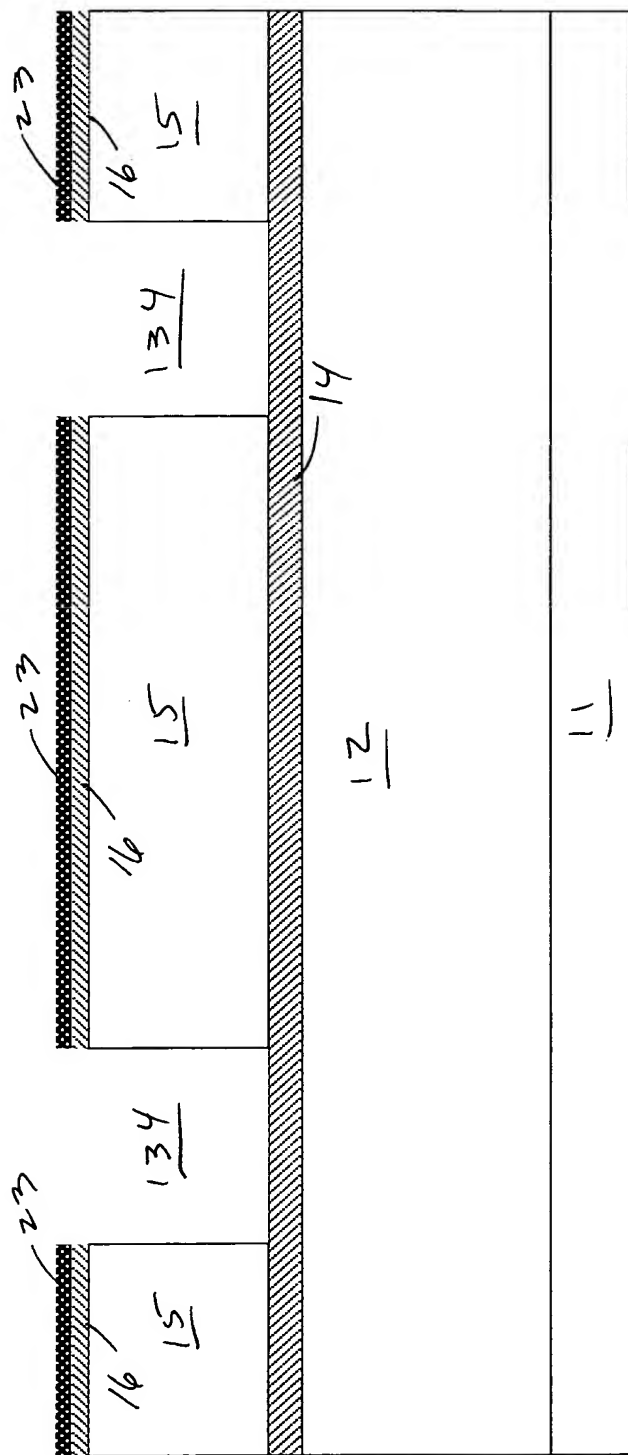


FIGURE 179

110 ↗

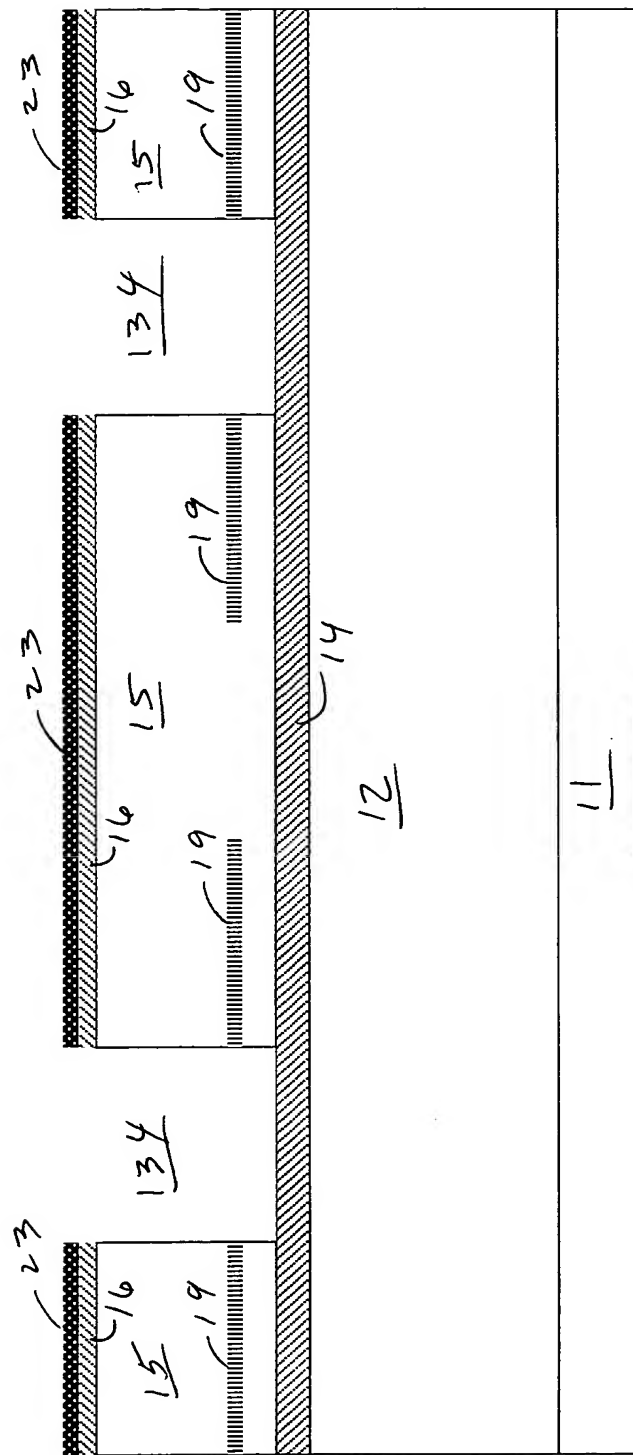


FIGURE 180

110

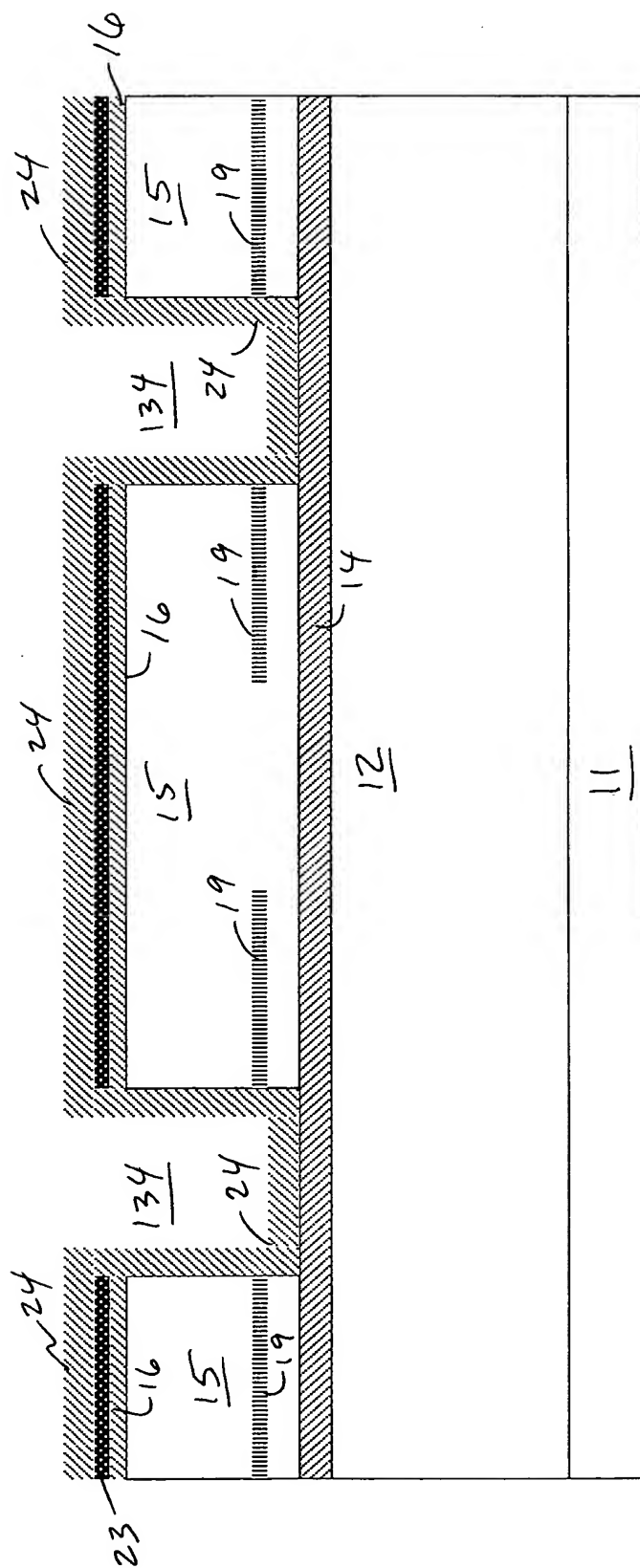


FIGURE 181

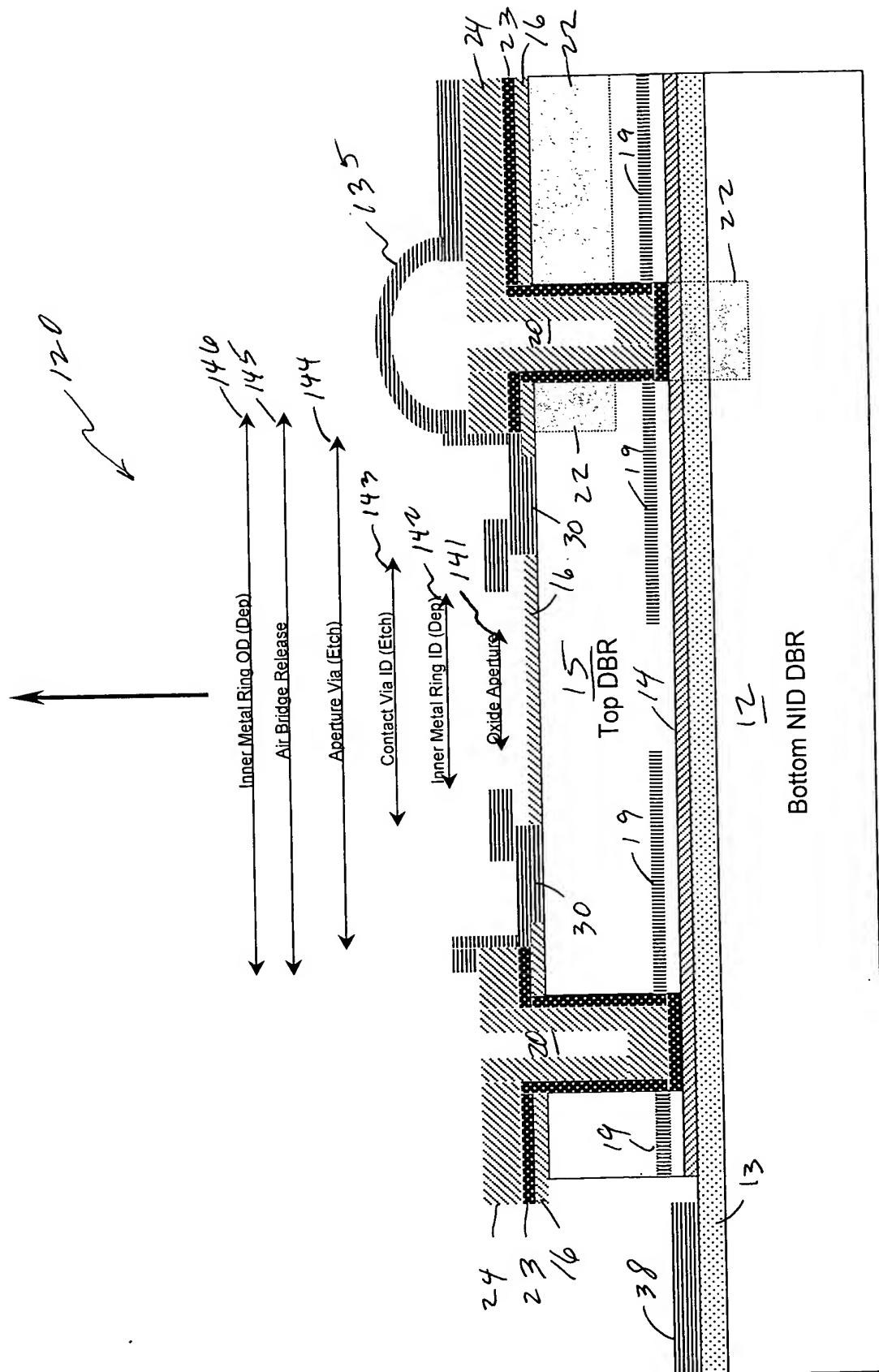


FIGURE 132

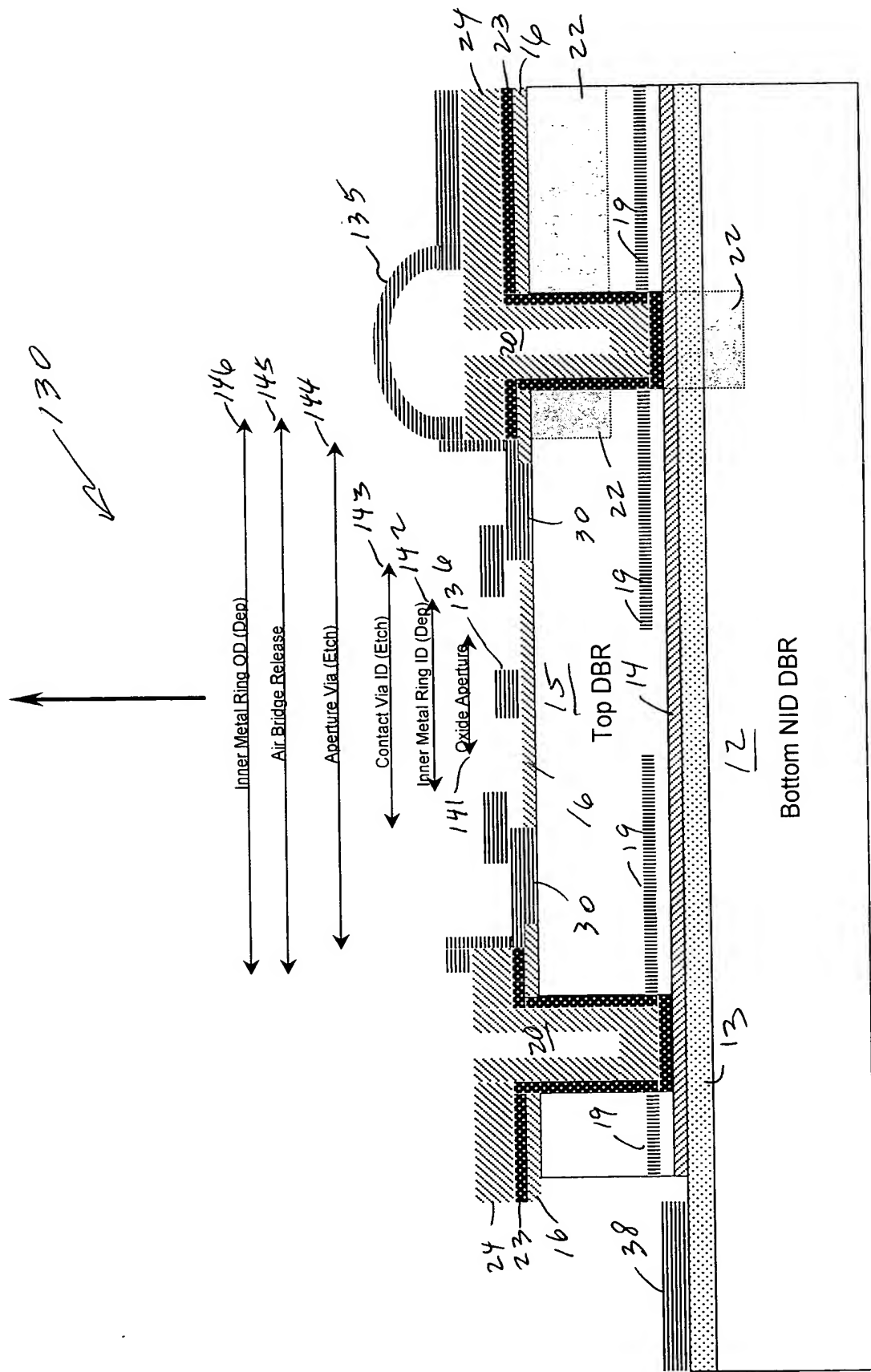
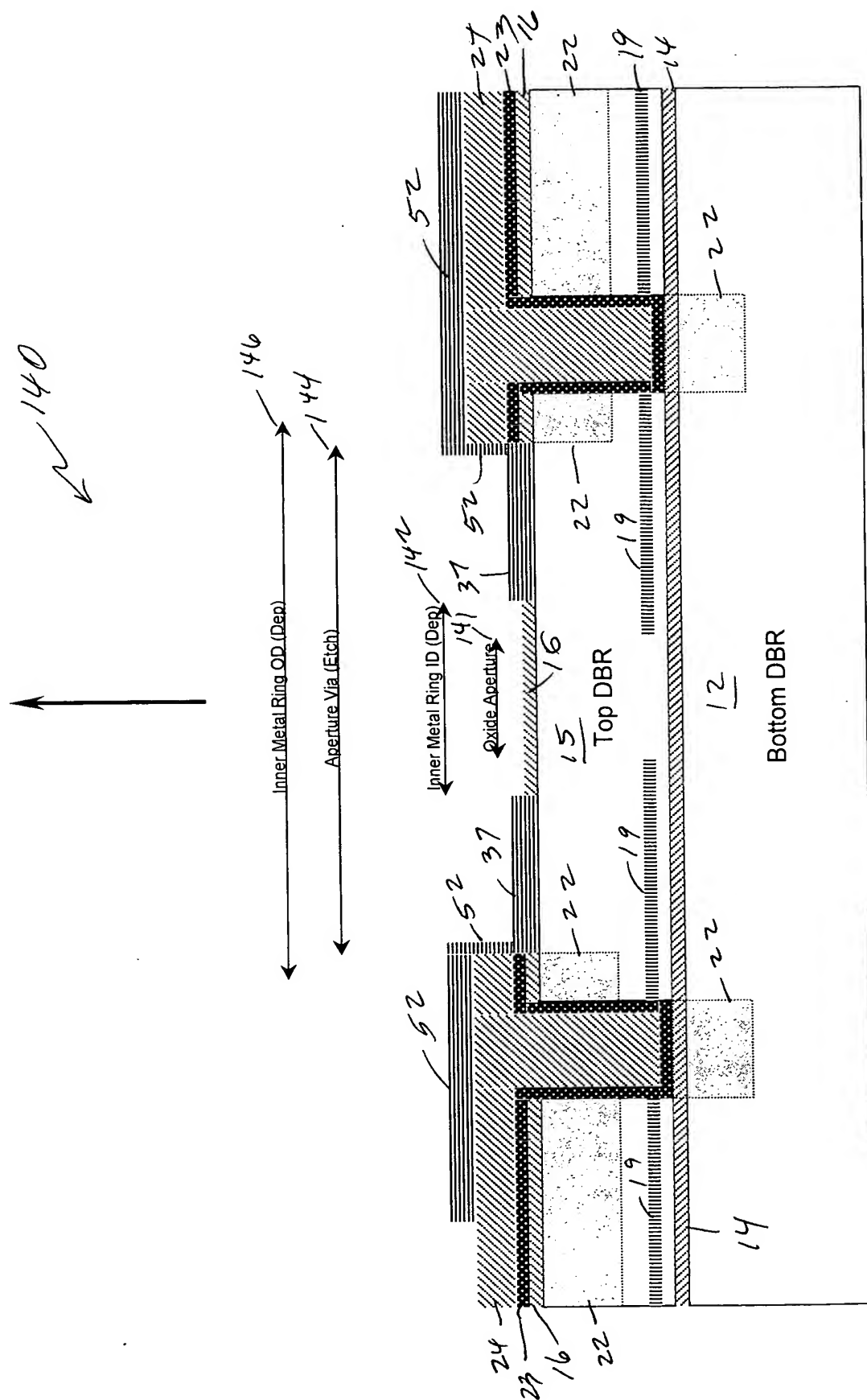
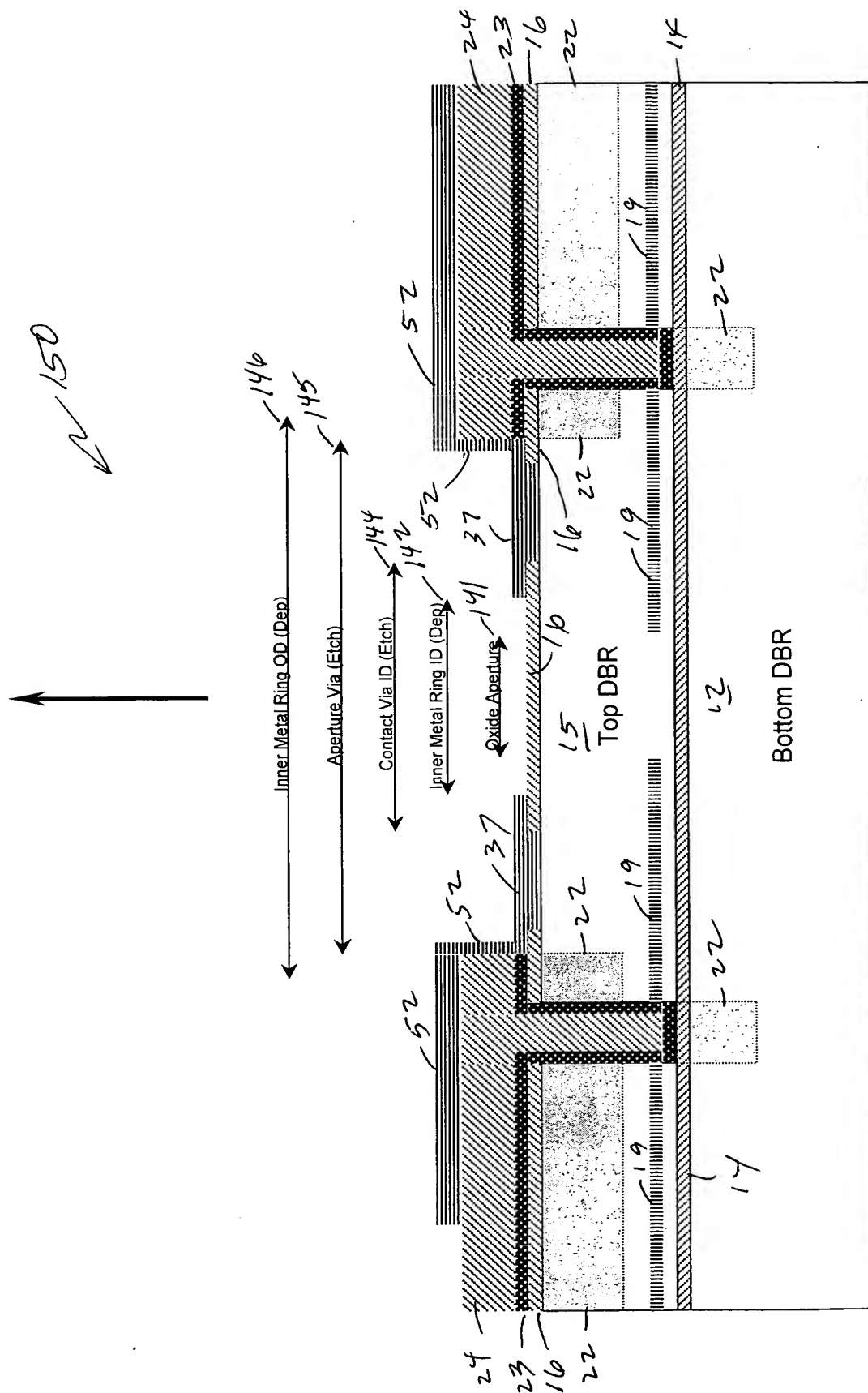


FIGURE 183





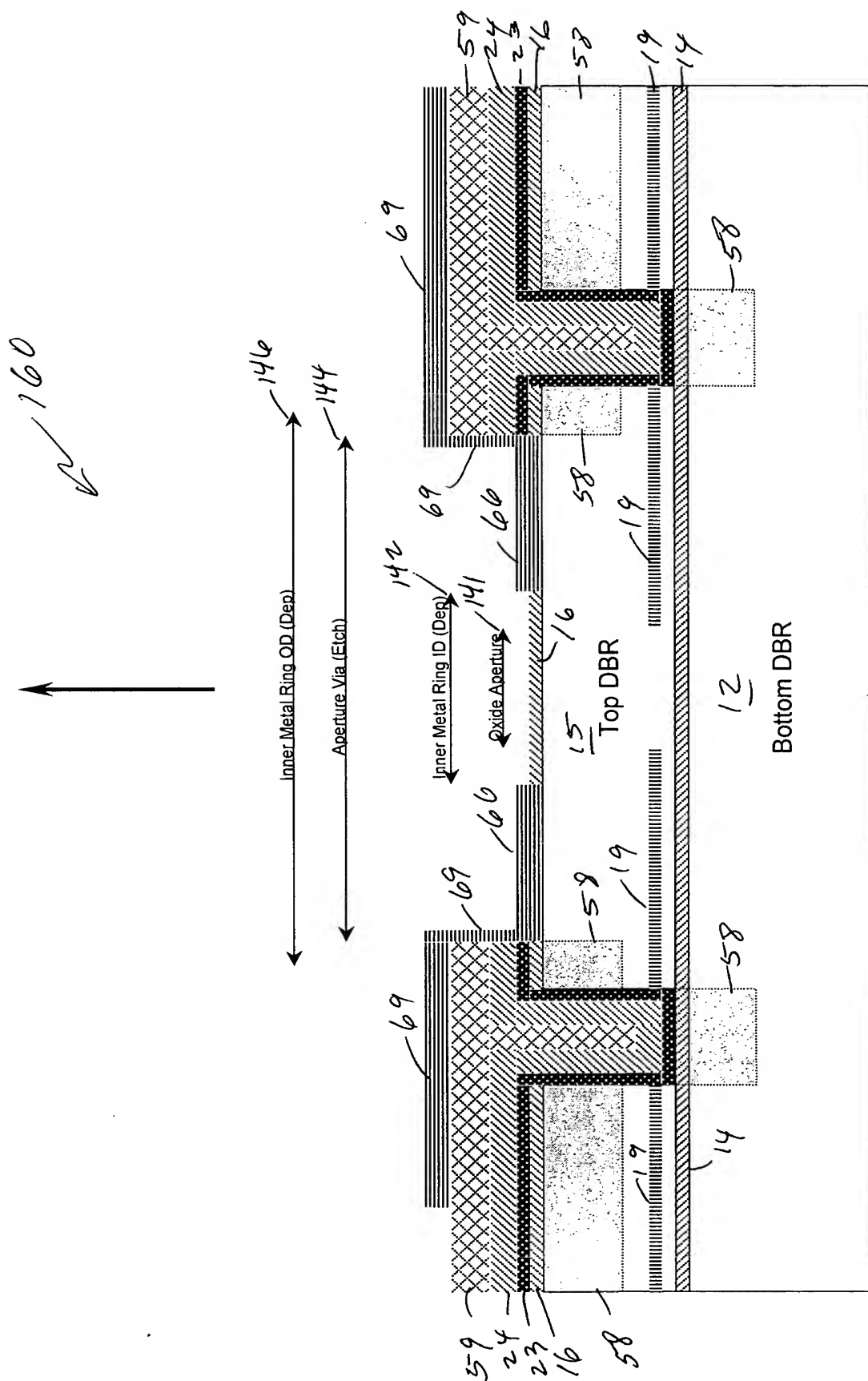


FIGURE 186

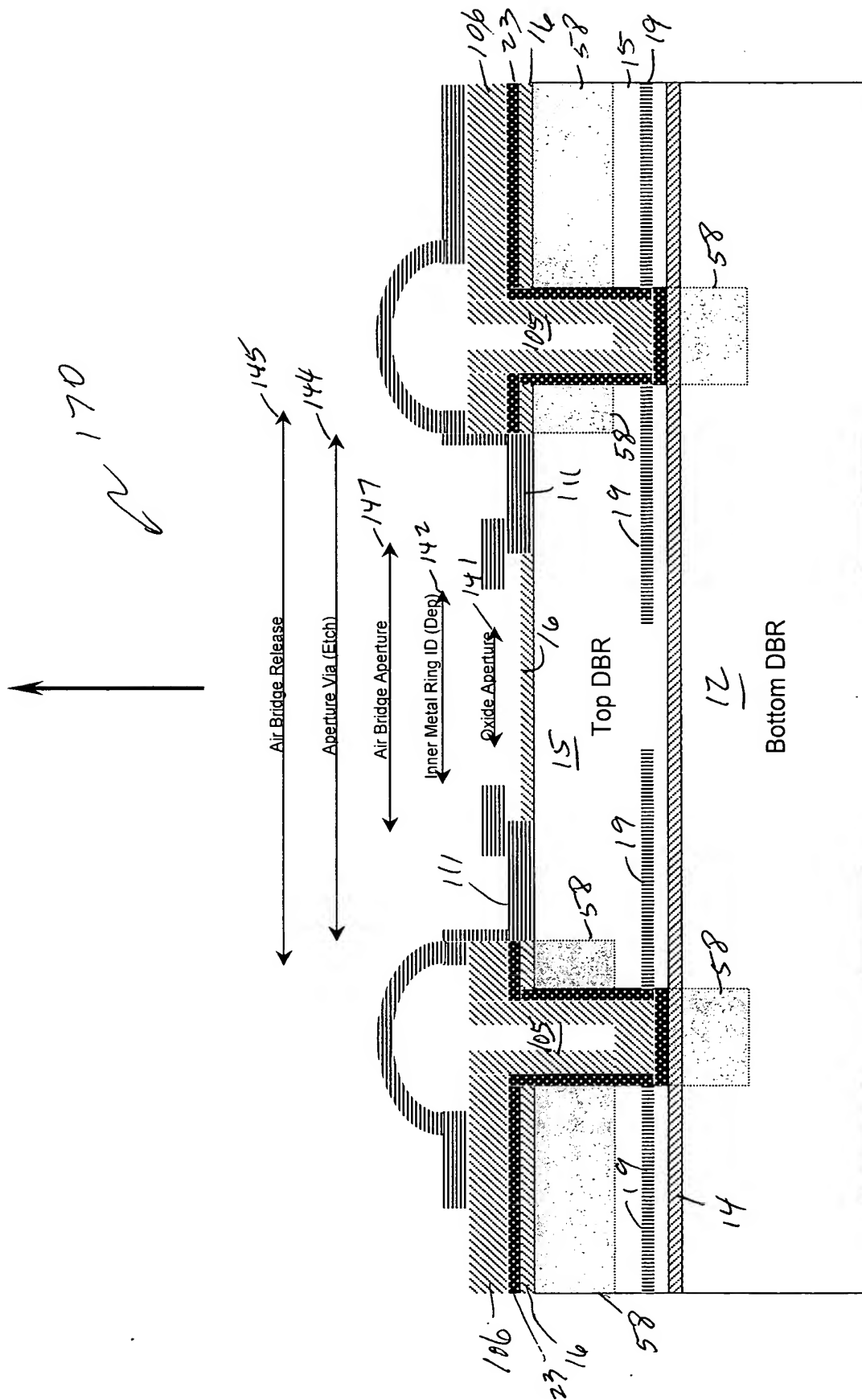


FIGURE 187

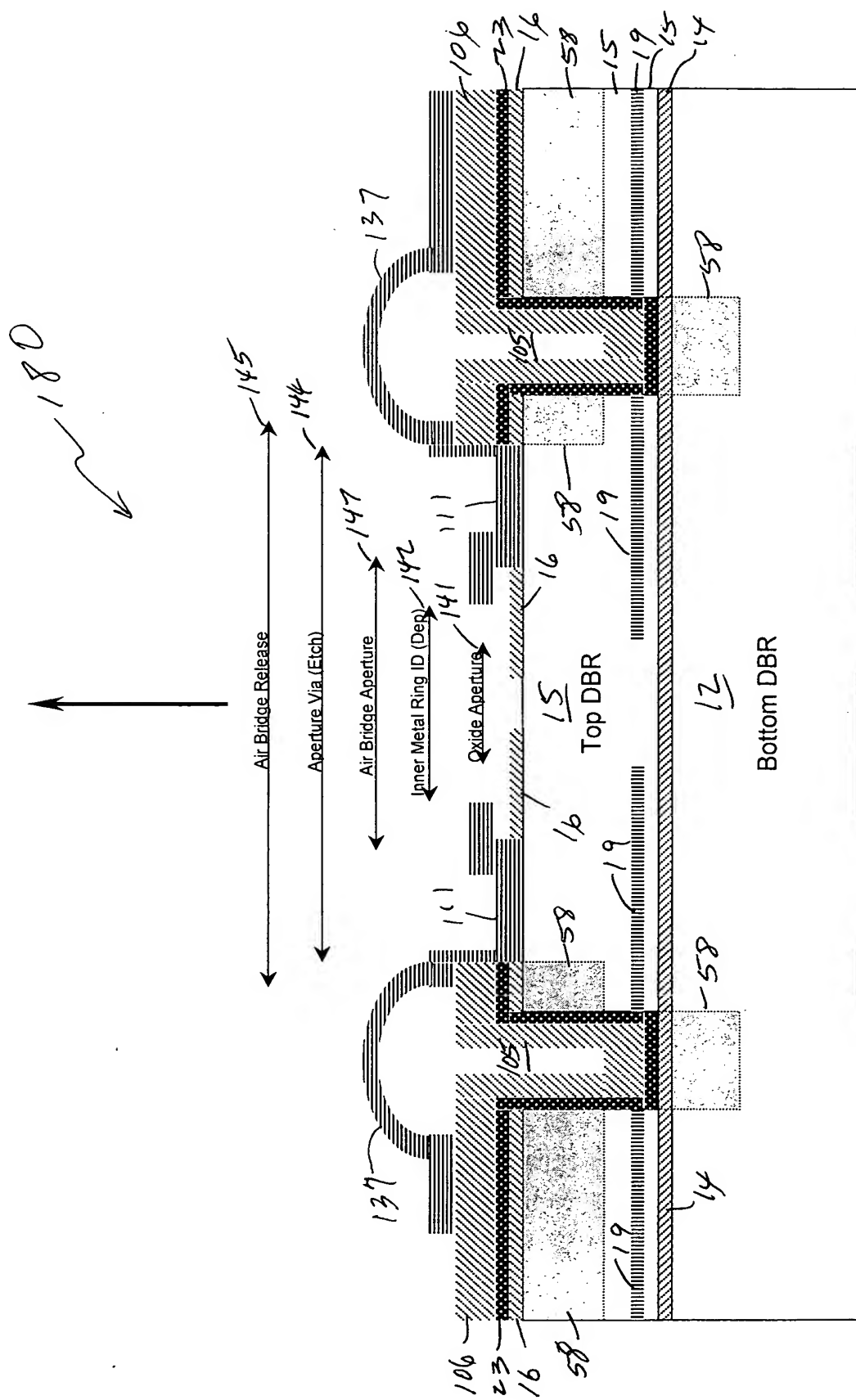


FIGURE 188

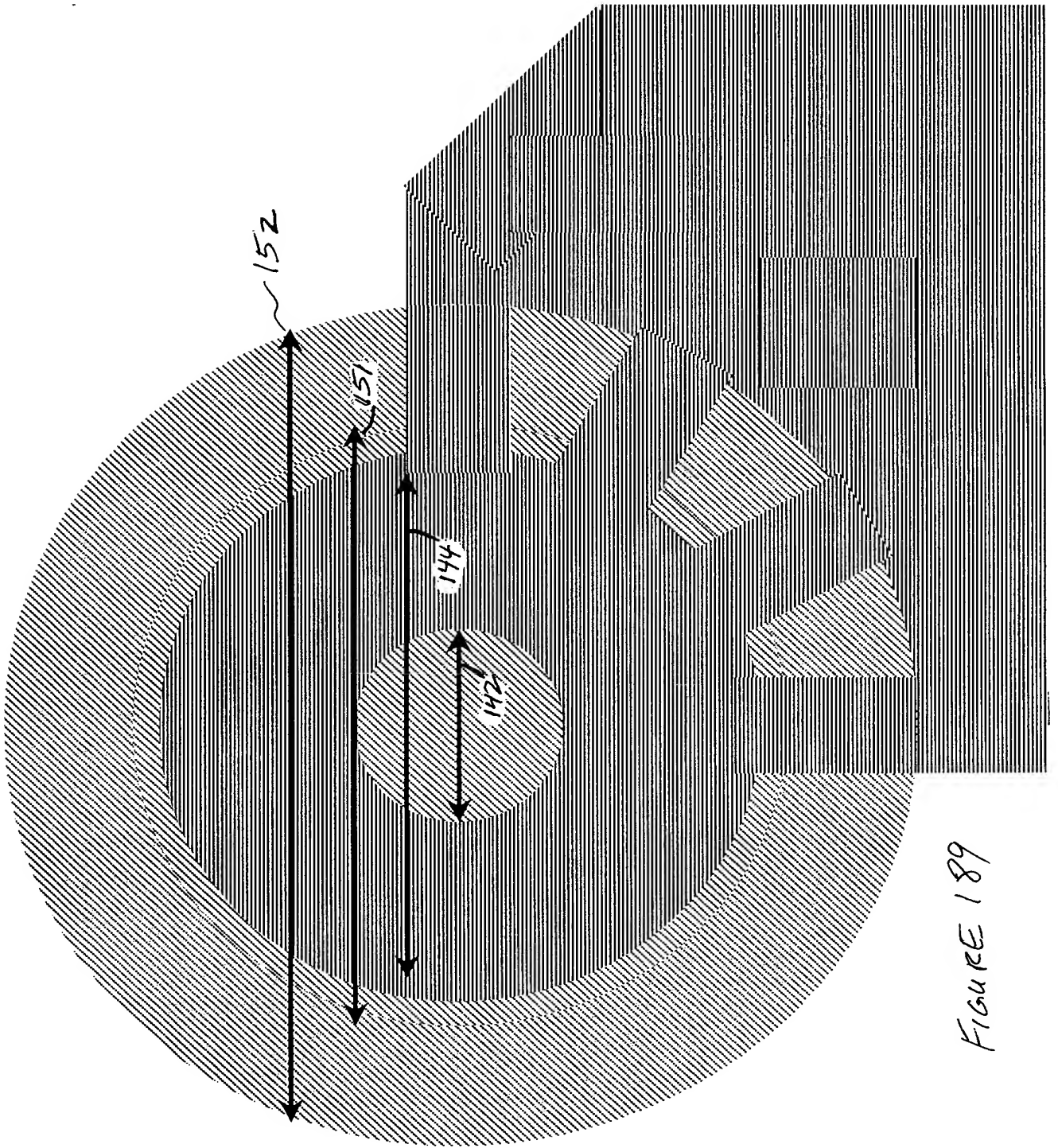


FIGURE 189

Standard Layout Geometry

<u>Feature</u>	<u>Variable</u>	<u>Dimension</u>	<u>Notes</u>
Oxide Aperture	A	Variable	VCSEL Aperture
Oxide Trench ID	B	A+20	10 um lateral oxidation
Thin Trench OD	-	B+5	2.5 um wide trenches
Wide Trench OD	D	B+8	4 um wide trenches
Isolation	-	B-4	Implant isolation
Aperture Via	-	B-4	Area without thick coating
Inner Metal ID	C	A+M	Metal aperture pullback variation
Inner Metal OD	-	B-2	Partially covers trench
Contact Via ID	-	C+3	optional? Extends below metal ID
Contact Via OD	-	B-6	Slightly less than aperture via
Air Bridge ID	-	B-2	For patternable trench fill-ins
Air Bridge OD	-	B+12	Matched to wide trenches
AB Aperture D	-	C+4	Larger than metal ID
Outer Metal ID	-	B+10	Partially covers wide trench
Outer Metal OD	-	B+18	4 um wide outer metal ring
SA Coplanar ID	-	D+8	Largest diameter: 42 um
SA Coplanar OD	-	180	Set to near edge of die
HOM(Metal) Filter	F	Variable	Circle/polygonal pattern in aperture area
HOM(Etch) Filter	F	Variable	Circle/polygonal pattern in aperture area

Oxide Aperture Variations (A): 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 um

Metal Pullback (diameter) (M): 1, 3, 5 um

Higher Order Mode Filter (diameter) (F): .5, 1, 2 um

FIGURE 190